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Hazardous Materials Technical Center

AD-A210 466

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

KALAKAKET CREEK RADIO RELAY STATION, ALASKA

April 1989

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Submitted to:

HQ AAC/DEPV
Elmendorf AFB, AK 99506

Submitted by:

Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

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EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in January 1988 to conduct the Installation Restoration Program (IRP) Preliminary Assessment of Kalakaket Creek Radio Relay Station (RRS), Alaska, under Contract No. DLA-900-82-C-4426 with funds provided by Alaskan Air Command (AAC).

Department of Defense (DoD) policy was directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5 dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

To implement the DoD policy, a four-phased IRP has been directed consisting of:

- Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment;
- Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study;
- Research, Development, and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation; and
- Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

The Kalakaket Creek RRS Preliminary Assessment included:

- an onsite visit, including interviews with four AAC personnel, conducted by HMTC personnel during 13 to 24 June 1988;
- the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the installation; and
- the acquisition and analysis of available geological, hydrological, meteorological, and environmental data from pertinent Federal, State, and local agencies.

B. Major Findings

Past installation operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the installation that used and disposed of hazardous materials/hazardous wastes (HM/HW) included vehicle maintenance; power production; petroleum, oils, and lubricants (POL) management; and management of batteries, electrical equipment, and paints. Small quantities of waste transformer fluid containing polychlorinated biphenyls (PCBs), lube oils, PD-680 solvent, synthetic oil, transmission fluid, motor gasoline, lead-acid batteries, fuel oil, aviation gasoline, diesel fuel, ethylene glycol, trichloroethane, paints, strippers, and thinners were generated by these activities (5099th CEOS, 1984). Asbestos was also used as a construction material at the facility.

C. Conclusions

Based on information obtained through interviews with Air Force personnel and review of installation records, small quantities of hazardous materials were used at the RRS while the facility was in operation. After the facility closed, the fuel storage tanks were drained and abandoned in place and electrical equipment, drums, and other debris were removed from the RRS. At the time of the site visit, no evidence of contamination was visible at the RRS. However, as it was a common practice at similar facilities to bury drums and waste

liquids, a landfill may exist in the vicinity of the RRS. In addition, asbestos was observed within the buildings at the RRS.

D. Recommendations

The electrical equipment, batteries, fuels, and drums at Kalakaket Creek RRS have been removed and no visible signs of contamination are evident at the facility. However, because a landfill may exist at the RRS, further IRP investigation is recommended to locate the landfill, determine if its contents are hazardous, remove any hazardous waste and contaminated soil, and dispose of the waste according to applicable state and Federal regulations. In addition, it is recommended that the identified asbestos be removed from the buildings and disposed of in accordance with appropriate state and Federal regulations.

I. INTRODUCTION

A. Background

The United States Air Force, due to its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, State, and local governments have developed strict regulations to require that disposers of hazardous materials/hazardous wastes (HM/HW) identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The current Department of Defense (DoD) Installation Restoration Program (IRP) policy was directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5 dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of military installations with existing environmental regulations. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DoD policy is to identify and fully evaluate suspected problems associated with past HM/HW disposal sites on DoD facilities, to control the migration of hazardous contamination, and to control hazards to health and welfare that may have resulted from these past operations. The IRP is a basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986.

To conduct the IRP Preliminary Assessment for Kalakaket Creek Radio Relay Station (RRS), the Headquarters Alaskan Air Command/Directorate of Programs and Environmental Planning (HQ AAC/DEPV) retained the Hazardous Materials Technical Center (HMTC) (operated by Dynamac Corporation) in January 1988 under Contract No. DLA-900-82-C-4426.

The Preliminary Assessment comprises the first phase of the DoD IRP and is intended to review installation records to identify possible hazardous waste-contaminated sites and to assess the potential for contaminant migration

from the installation. The Site Investigation (not part of this contract) consists of follow-on field work as determined from the Preliminary Assessment. The Site Investigation includes a preliminary monitoring survey to confirm the presence or absence of contaminants. Upon confirmation of contamination, additional field work is implemented under a Remedial Investigation (not part of this contract) to determine the extent and magnitude of the contaminant migration and provide data necessary for determining appropriate remedial actions, which are evaluated during the Feasibility Study (not part of this contract). Research, Development, and Demonstration (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Remedial Design/ Remedial Action (not part of this contract) includes those activities which are required to control contaminant migration or restore the installation.

B. Authority

The identification of hazardous waste disposal sites at Air Force installations was directed by Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations.

C. Purpose of the Preliminary Assessment

DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health or welfare that may have resulted from these past operations. HMTC evaluated the existence and potential for migration of HM/HW contaminants at Kalakaket Creek RRS by visiting the installation; reviewing existing installation records concerning the use, generation, and disposal of HM/HW; reviewing available environmental information; and conducting interviews with present Air Force personnel who are familiar with past hazardous materials management activities at the installation.

A physical inspection was made of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the installation, with special emphasis on the history of past operations and their past HM/HW management procedures; local geological, hydrological, and meteorological conditions that may affect migration of contaminants; local land use,and zoning requirements that could affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

D. Scope

The Preliminary Assessment program included a pre-performance meeting, an onsite installation visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at HQ AAC/DEPV, Elmendorf Air Force Base (AFB), Alaska, on 13 June 1988. Attendees at this meeting included representatives of the HQ AAC/DEPV and HMTC. The purpose of the pre-performance meeting was to provide detailed project instructions, clarification and technical guidance by AAC, and to define the responsibilities of all parties participating in the Kalakaket Creek RRS Preliminary Assessment.

The scope of this Preliminary Assessment is limited to the installation and includes:

- An onsite visit;
- The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the installation;
- The acquisition of available geological, hydrological, meteorological, land use and zoning, and critical habitat data from various Federal, State and local agencies;
- A review and analysis of all information obtained; and

- The preparation of a report to include recommendations for further actions, if warranted.

The onsite visit, records search, and interviews with Air Force personnel were conducted during the period 13 to 24 June 1988. The Preliminary Assessment site visit was conducted by Mr. Raymond G. Clark, Jr., P.E., Department Manager/ Project Leader; Ms. Betsy Briggs, Project Manager/Hazardous Waste Specialist; Ms. Natasha Brock, Environmental Scientist; Mr. Lance Gladstone, Environmental Scientist; and Mr. David Hale, Civil Engineer. Other HMTC personnel who assisted in the Preliminary Assessment included Mr. Mark Johnson, P.G./Program Manager; and Ms. Janet Emry, Hydrogeologist (see Appendix A). Personnel from AAC who assisted in the Preliminary Assessment included Mr. James W. Hostman, Chief, Environmental Planning HQ AAC/DEPV; and Mr. Jeffrey M. Ayres, Point of Contact (POC) at HQ AAC/DEPV.

E. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This Preliminary Assessment methodology ensures a comprehensive collection and review of pertinent site specific information, and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

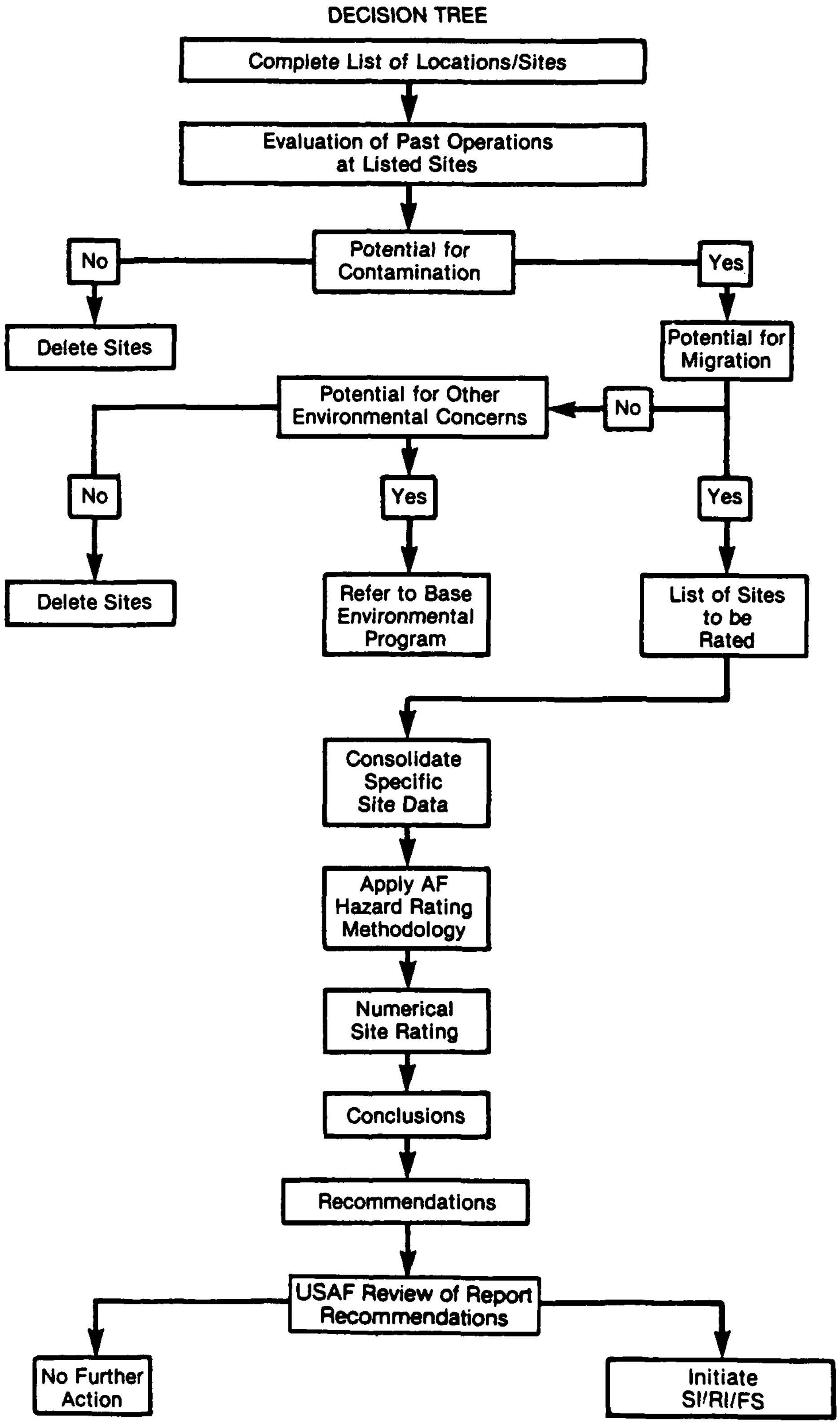
The Preliminary Assessment begins with a site visit to the installation to identify all potential areas where contamination may have resulted from the use or disposal of HM/HW. Next, an evaluation of past HM/HW handling procedures at the identified locations is made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with Air Force personnel familiar with the various past operating procedures at the installation. The interviews also define the areas on the installation where any waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

HMTC

PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.

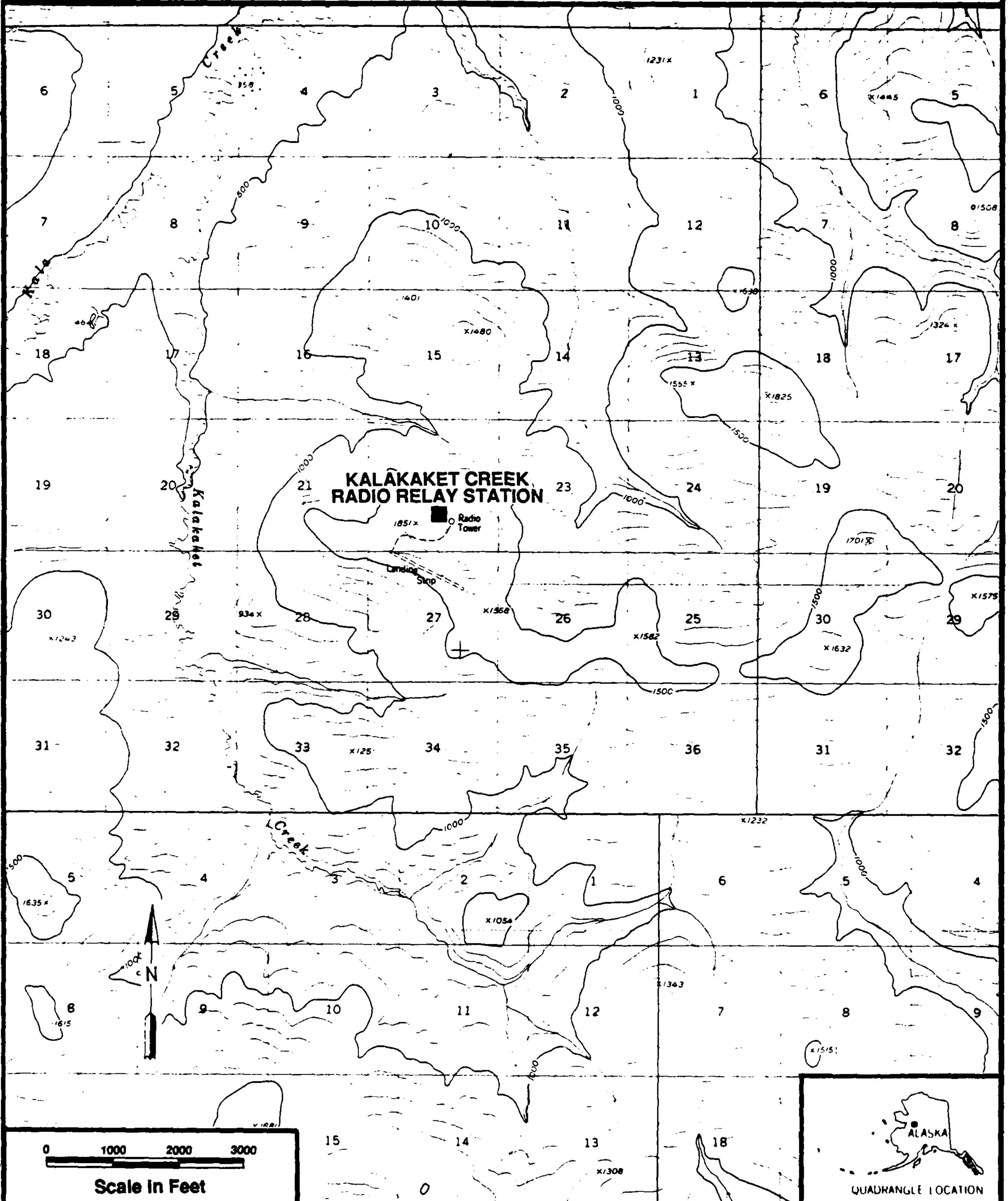
Preliminary Assessment Methodology Flow Chart.



Source: U.S.G.S. Nulato (B-2) Quadrangle, Alaska, 7.5 Minute Series Topographic Map, 1973.

Figure 2.

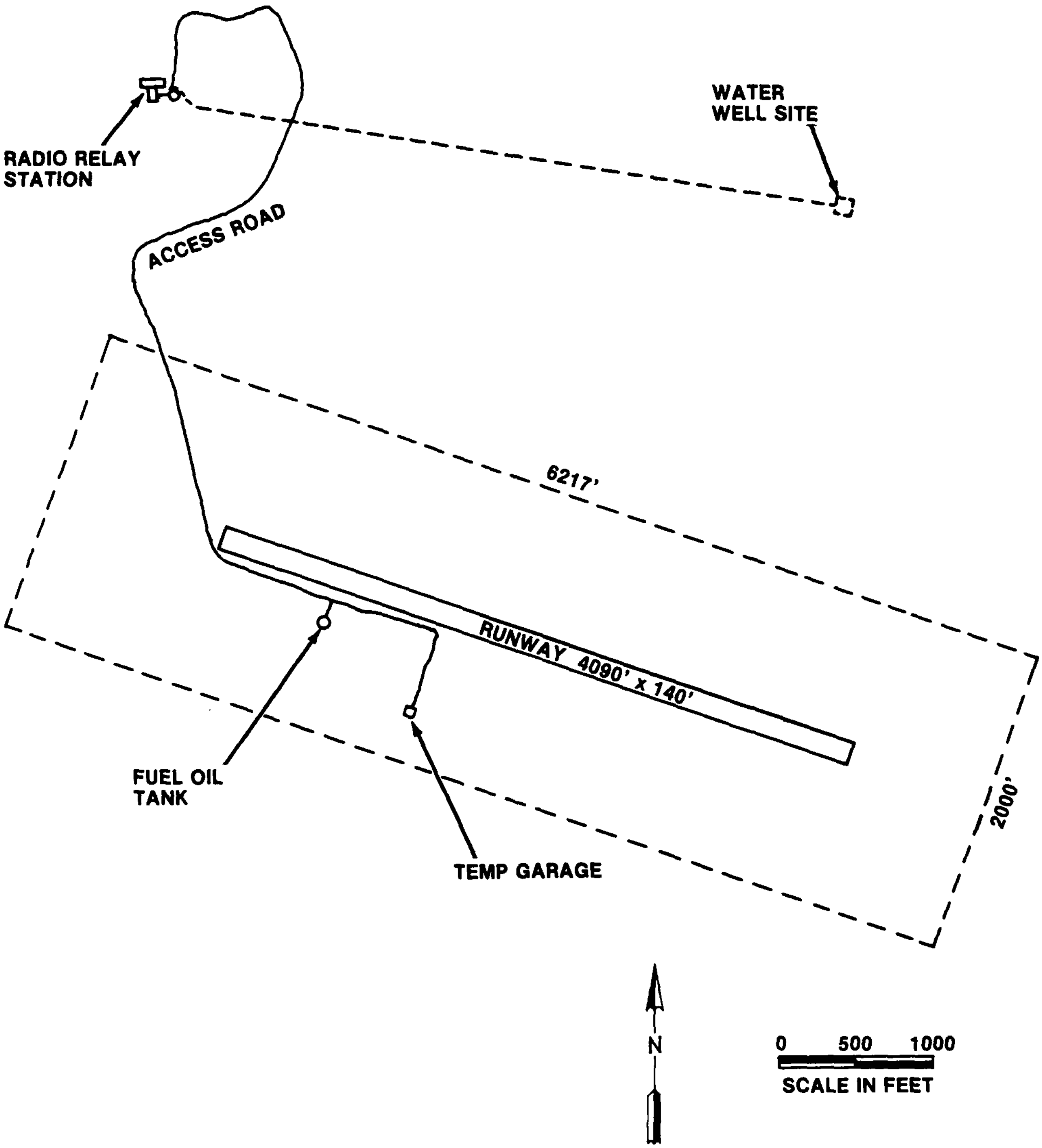
Location Map of Kalakaket Creek Radio Relay Station, Alaska.



HMTC Source: Radio Relay Site
Contract Services
ALAACS Region, Undated.

Figure 3.

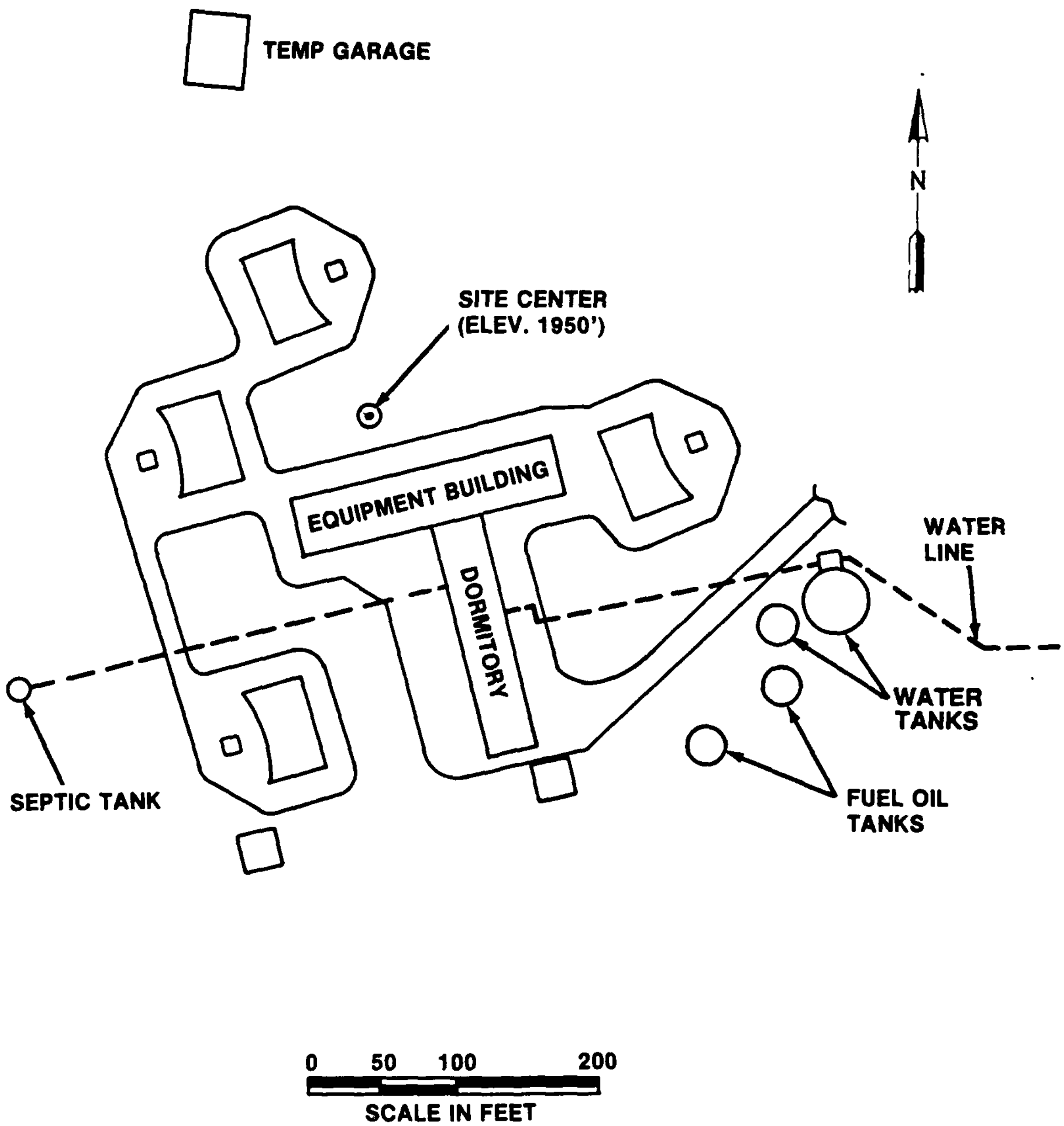
Site Map of Runway and Access Road to Kalakaket Creek Radio Relay Station, Alaska.



Source: Radio Relay Site
Contract Services
ALAACS Region, Undated.

Figure 4.

Site Map of Kalakaket Creek Radio Relay Station, Alaska.



155 miles away, with two 60-foot antennas; and Tatalina RRS, 107 miles away with a pair of 30-foot dish antennas. A microwave link was added to Campion and Galena. During 1959 through the mid-1960s, Alaska Telephone Switching Station capabilities were also added to Kalakaket Creek RRS (Reynolds, 1988).

The 31 stations, including Kalakaket Creek RRS, were becoming obsolete during the late-1960s with the development and implementation of satellite communication systems. By 1973, with the launch of the first viable communications satellite, SATCOM, the stations were abandoned.

With the passing of the Alaska Communications Disposal Act in 1967, the Federally-owned sites are now being relinquished. Kalakaket Creek RRS is being relinquished to the Bureau of Land Management (BLM), requiring site cleanup and remediation (LeFrancois, 1985). Members of the 5099th Civil Engineering Operations Squadron (CEOS) from Elmendorf AFB, Alaska, arrived at Kalakaket Creek RRS to perform cleanup operations on 28 September 1984 and departed on 9 November 1984.

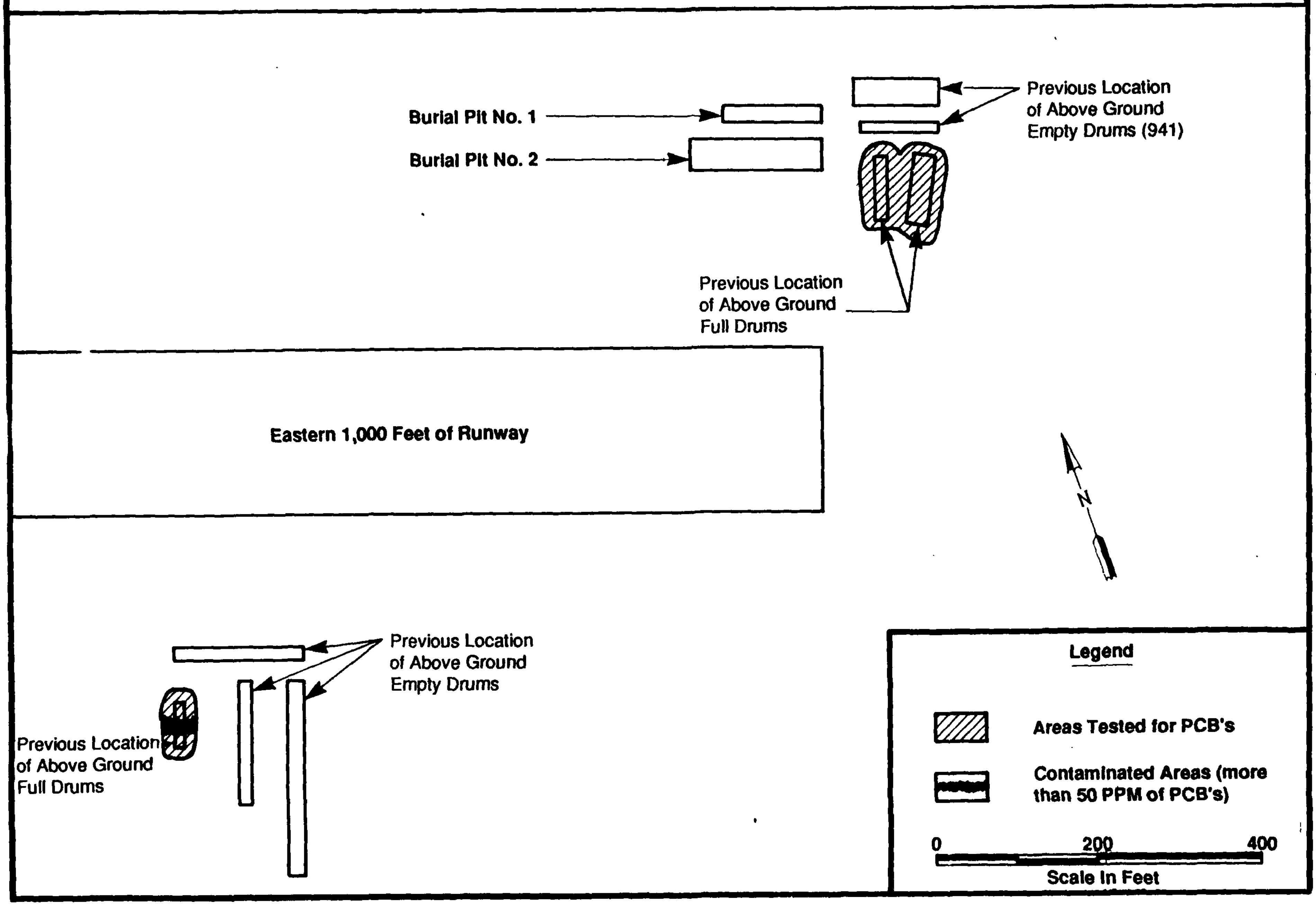
The 5099th CEOS buried the debris found at the RRS in three pits: two on the northern side of the east end of the runway (see Figure 5) and a third on the north side of the hill going up to the RRS. Debris buried included CO_2 fire extinguisher bottles; three 1,000-gallon tanks; two International Carryall trucks; one International Pick-up truck; one Ford Cargo truck; two Osh Kosh snow plow beds; old dump truck beds; and 3,250 cleaned, crushed, empty 55-gallon drums (5099th CEOS, 1984).

PCB testing was performed on the containers of liquids found. Soil testing for PCBs was performed where drums were found on the northern and southern sides of the east end of the runway (see Figure 5) and on the south side of the power plant where three 208 volt to 2,300 volt transformers were located (see Figure 6). The results of the PCB testing are located in Appendix D. Contaminated soil was removed from these areas and the remaining soil retested until the test results indicated PCB concentrations of less than 50 ppm.

HMTC Source: Records Maintained by the 5099th CEOS.

Figure 5.

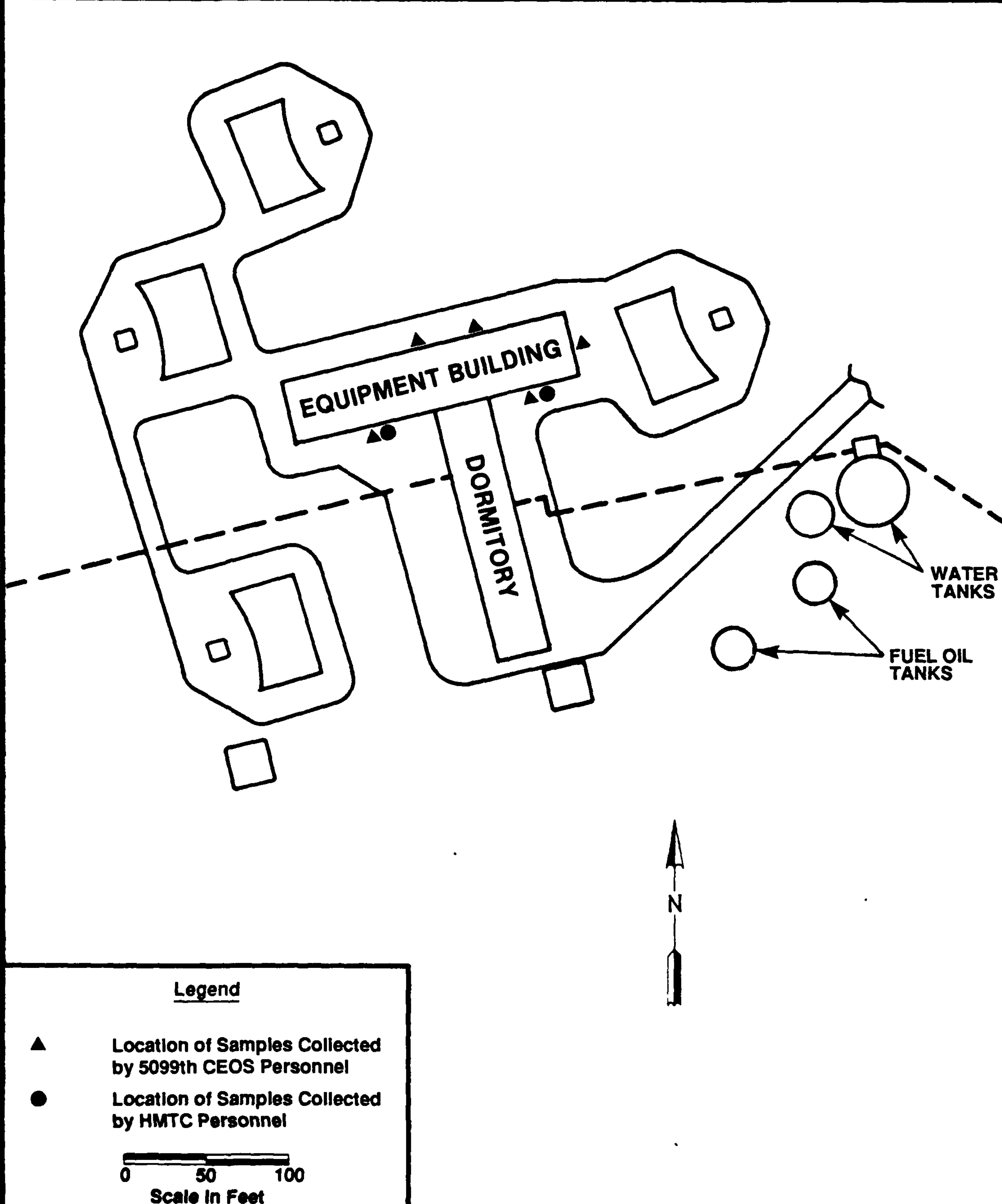
Conditions at East End of Runway at Kalakaket Creek Radio Relay Station, Alaska, from September to November, 1984.



HMTC Source: Radio Relay Site
Contract Services
ALAACS Region, Undated.

Figure 6.

Map of PCB Soil Sampling Locations at Kalakaket Creek Radio Relay Station, Alaska.



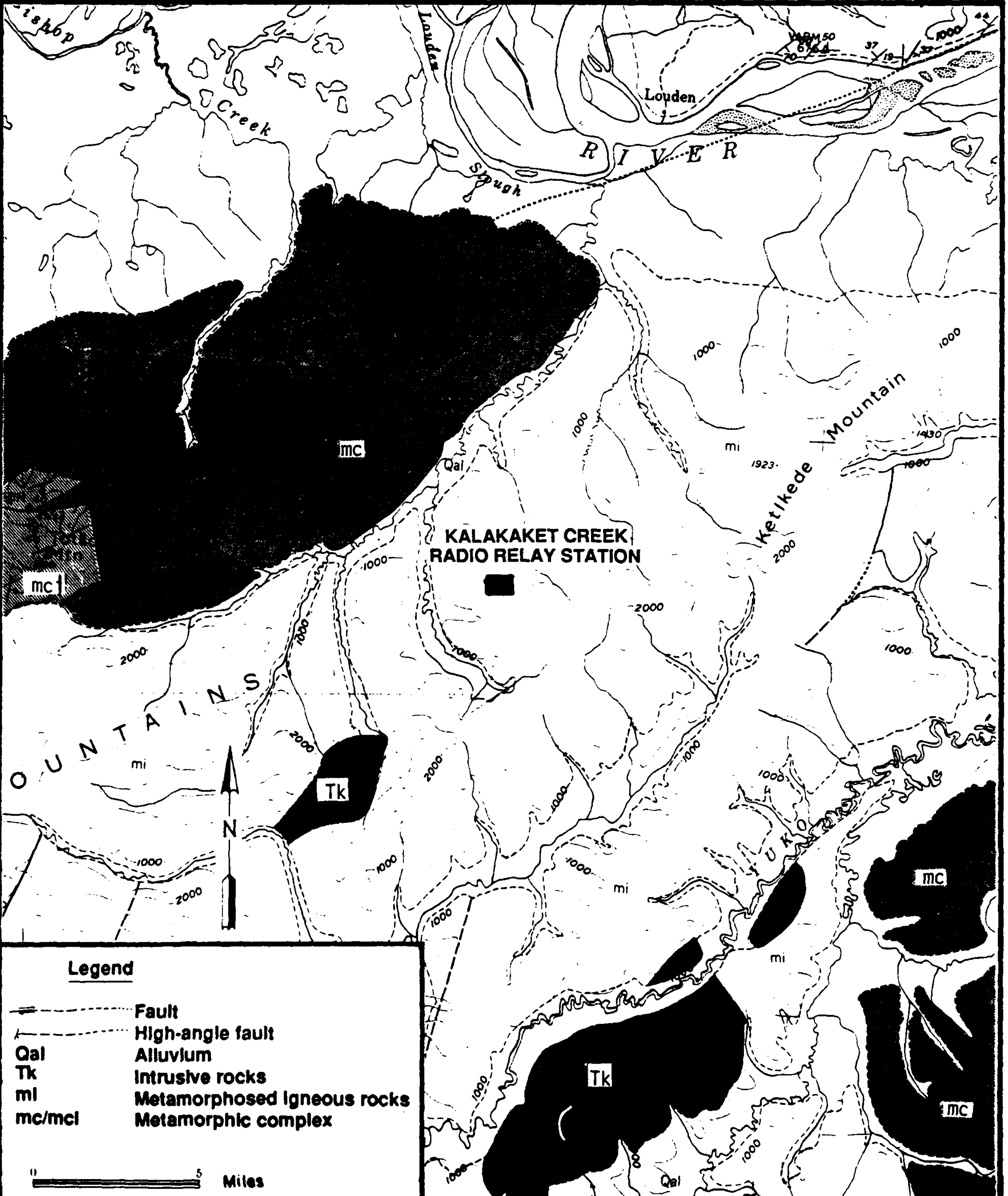
During this period of time, the station and runway areas were inspected, investigated, and remediated. The following items were flown back to Elmendorf AFB for proper disposal:

- 7 85-gallon overpack drums of PCB-contaminated soil,
- 75 55-gallon drums of PCB-contaminated oil,
- 1 5-gallon can of PCB Pyronal, and
- 48 55-gallon drums of oils.

The cleanup operations at Kalakaket Creek RRS were documented in a "Finding of No Significant Contamination" and "PCB Clearance Certificate". Both were signed and dated on 12 September 1985. Copies of the certificates are located in Appendix E.

HMTC Source: USGS Miscellaneous Geologic Investigations Map I-291, 1959.

Figure 7. Geologic Map of Kalakaket Radio Relay Station, Alaska and Vicinity.



metamorphosed basalt, diabase of probable extrusive origin, and diorite, diabase, gabbro, and pyroxenite of probable intrusive origin (Cass, 1959).

Underlying the metamorphosed igneous rocks is a metamorphic complex of late Precambrian or early Paleozoic age. The metamorphic complex is composed of quartz-mica schist, quartzitic schist, mica schist, albite-chlorite schist, albite-mica schist, ottrelite-mica schist, glaucophane-mica schist, some phyllite, slate, sheared chert, and quartzite. There are also areas of recrystallized limestone (Cass, 1959).

Volcanic rock of unknown age underlies the metamorphic complex. The volcanic rock is composed mainly of basalt and andesite. Rarely are rhyolite, tuff, chert, agglomerate, and breccia found. In some places, the rocks are lying flat or gently dipping and unaltered. At other locations, the rocks are highly folded, faulted, and altered (Cass, 1959).

Northwest of the Kalakaket area is the Koyokuk Cretaceous Basin, a down-dropped basin filled with the Cretaceous age graywackes, shales, grits, and conglomerates of the Shaktolik Group and Ungalik Formation. These rocks are overlain in much of the basin by Quaternary alluvium deposited by the Yukon River and its tributaries. The dominant structural feature of these Cretaceous age rocks is the trend of fold axes found in the northeastern portion of the quadrangle. The beds are tightly folded and some overturned. The fold axes plunge steeply and reversals of plunge along the axes commonly occur. Drag folds are common where shale predominates and are less common where graywacke predominates. It is very likely that the older, Carboniferous or Post Carboniferous rocks underlie the Cretaceous rocks in at least part of the basin (Cass, 1959).

Throughout the Kalakaket area, reverse faults and strike-slip faults with large stratigraphic throw occur. Many of the faults appear to be related to folding. Faults are both along and across the trend of the fold axes. The thrust movement was eastward. Stream cuts reveal that many of the major folds have been faulted along the strike of the beds, but these faults are not apparent

on the hills and ridges. Many strike faults are reverse faults. Recent adjustments along normal faults in this area are indicated by scarps formed in alluvial fans of Quaternary age. Approximately 5.5 miles south-southwest of the RRS is a granite pluton of Cretaceous or Tertiary age. Several other granite and diorite plutons occur within the Kalakaket area (Cass, 1959).

According to the U.S. Soil Conservation Service, the soils in the general vicinity of Kalakaket Creek are of the Pergelic Cryumbrepts-Histic Pergelic Cryaquepts, very gravelly, hilly to steep association. The association is found in glacially carved mountain valleys, moraine foot slopes, and hills throughout the South Central Alaska Mountains and on the Copper River Plateau. Included are some sharp peaks and ridges with bedrock exposures. Elevations range from 3,000 to 5,600 feet. The majority of this area is above tree line except in some valleys where stunted black spruce may be found.

This area is not used for agriculture or forestry. The vegetation is used primarily by wildlife, including moose and caribou as habitat. Construction is severely limited due to permafrost and steep slopes.

The soil in this association is composed of four principal components and two other components. Of the principal components, Pergelic Cryumbrepts, very gravelly, hilly to steep, accounts for 45 percent. These are well drained soils on upper slopes of high hills and ridges. Surface soils are a very dark brown or dark gray in color. Subsoils are brown or olive. Generally, the texture is very gravelly loam or silt loam. Some soils have a thin layer of windlaid silt loam at the surface. When encountered, ice-rich permafrost is many feet in depth.

Histic Pergelic Cryaquepts, very gravelly, hilly to steep, accounts for 25 percent of the soils. They are poorly drained and found on lower hillsides and steep north-facing slopes. Formation occurred in glacial till on colluvial deposits under a cover of sedges, mosses, and low shrubs. The soils have a thick peaty surface mat of organic material. Gray very gravelly loam or sand loam is found underneath. Ice-rich permafrost is at a shallow depth.

Fifteen percent are Pergelic Cryorthods, very gravelly, hilly to steep. These soils are well drained and found primarily on south-facing slopes of hills and ridges. They were formed in very gravelly glacial till, covered in many places with a thin layer of loess. These soils have thin albic and spodic horizons over very gravelly loam or sandy loam. If present, ice-rich permafrost is found at a great depth.

Pergelic Cryochrepts, very gravelly, hilly to steep soils account for 10 percent of this association. These soils are well drained and are located on moraines and steep slopes of ridges, under low shrubs, forbs, grasses, mosses, and lichens. Usually the thin top layer is very dark brown silt loam over dark yellowish-brown gravelly silt loam and olive very gravelly sandy loam or loam. If present, ice-rich permafrost is found at a great depth.

The remaining 5 percent are Histic Pergelic Cryaquepts, loamy, nearly level to rolling, and Pergelic Cryaquepts, very gravelly, nearly level to rolling. Both are poorly drained soils that occupy narrow valley bottoms and depressions in moraines and gentle foot slopes and narrow drainageways.

According to U.S. Soil Conservation Service, the permeability of surface soil in this association is moderate to rapid (4.45×10^{-4} to 1.41×10^{-2} cm/sec) until permafrost is encountered. Once permafrost is encountered, the soil is impermeable.

C. Hydrology

Surface Water

Kalakaket Creek RRS is located approximately 3,900 feet east of Kalakaket Creek, a tributary of Kala Creek. Surface runoff from the northern and western portions of the RRS flows off the facility to the north or northwest and into a small tributary to Kalakaket Creek. Runoff from the southern portion of the RRS flows toward the southwest and into another small tributary. Runoff from the eastern and southeastern portions of the facility drains to the east and into

a small creek that flows north directly into Kala Creek. Kala Creek is a tributary of the Yukon River. The water use of these creeks is for management of fish and wildlife. Due to the high elevation the RRS lies outside any flood plains.

Groundwater

Specific groundwater data for the Kalakaket Creek RRS area is not available; however, some general assumptions can be made based on the nature of the soils and geology of the area. Shallow groundwater, if present at the RRS, occurs within the soil and weathered greenstone bedrock. Groundwater may also occur in joints, fractures, and shear zones within the bedrock. Jointing generally occurs in the uppermost 300 feet; fractures associated with faulting, however, can occur at any depth. The shallow groundwater flow generally mimics the surface water flow; most of the shallow groundwater at Kalakaket Creek RRS probably flows to the northwest or southwest and discharges to Kalakaket Creek and its tributaries. Due to its remote location, no water wells were found in the vicinity of the RRS.

D. Critical Habitats/Endangered or Threatened Species

According to the U.S. Fish and Wildlife Service, Alaska Division, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the RRS. There are no federally- or state-designated critical habitats or wilderness areas within a 1-mile radius of Kalakaket Creek RRS. The National Wetlands Inventory currently has not mapped any wetland areas within a 1-mile radius of Kalakaket Creek RRS, however, there are believed to be wetlands by the U.S. Fish and Wildlife Service.

IV. FINDINGS

A. Activity Review

A review of installation records and interviews with AAC personnel resulted in the identification of specific operations at Kalakaket Creek RRS in which HM/HW were handled and generated. The operations included vehicle maintenance; power production; petroleum, oils, and lubricants (POL) management; electric shop; paint shop; and battery shop. Small quantities of waste transformer fluid containing PCBs, gasoline, lead-acid batteries, fuel oil, aviation gasoline, diesel fuel, ethylene glycol, trichloroethane, paints, strippers, and thinners were generated by these activities (5099th CEOS, 1984). Asbestos was also used at the RRS as a construction material.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Air Force personnel and subsequent site inspections resulted in the identification of no potentially contaminated sites at Kalakaket Creek RRS. Although no sites were identified or assigned a HAS according to HARM, the methodology and guidelines are included as Appendix C. The objective of this assessment is to identify and provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score would reflect specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a one-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding).

C. Other Pertinent Information

The site visit to Kalakaket Creek RRS was conducted on 21 June 1988. The following observations were made:

- Areas suspect of containing asbestos at this site include the dormitory (corridors and rooms), equipment building, and the exhaust manifolds in the diesel fuel pump house. In the equipment building, an estimated 100 feet of piping and 60 feet of duct work are suspect. In the dormitory, 250 SF of metal jacketed boiler insulation and 100 feet of piping are suspect. In each pump house, 25 feet of insulation are suspect (Babics, 1984). During the site visit, it was apparent that an asbestos survey had been conducted as friable asbestos was clearly marked and labelea (see Photos 7 and 8, Appendix F).

- At the time of the site visit, a few 55-gallon drums were found on the hillside. These drums were rusted and apparently had been used for target practice (see Photos 9 and 10, Appendix F). There were no visible signs of leakage such as stained soil or lack of vegetation.

- There were no signs of any landfills in the vicinity of the runway or the station, although it was common practice at similar facilities to bury drums and waste liquids.

- Two PCB soil tests were performed outside the transformer room. The tests were both negative (see Photos 11 and 12, Appendix F). Two areas of stained soil were observed on the east side of the equipment room. The two areas were examined using a photoionization detector (PID). Readings from the PID were negative.

- One, partially full, 55-gallon drum of lube oil was found in the temporary garage (see Photo 13, Appendix F). There were no signs of leakage and/or spillage.

- All fuel oil tanks were found empty and there were no signs of leakage or spillage.

- Equipment and items found at the RRS included vehicles (see Photos 14 and 15, Appendix F), cylinders used for fire fighting (see Photo 16, Appendix F), and lead-acid batteries.

V. CONCLUSIONS

Based on information obtained through interviews with Air Force personnel and review of installation records, small quantities of hazardous materials were handled at Kalakaket Creek RRS while the facility was operational.

At the time of the visit, there was no visible evidence of contamination (i.e., stained soil, abandoned drums, or uncovered burial pits) at the facility. All fuel storage tanks had been drained and abandoned in place and electrical equipment, contaminated soil, drums, and debris has been removed by the 5099th CEOS (5099th, 1984). Because it was common practice at similar facilities to bury drums and waste liquids, a landfill may exist at the RRS. The only other health and safety concern at Kalakaket Creek RRS is the identified asbestos that remains within the buildings.

VI. RECOMMENDATIONS

The small quantities of hazardous materials at Kalakaket Creek RRS have been removed and fuel storage tanks have been abandoned. At the time of the site visit, no visible signs of contamination were evident at the facility. However, because a landfill may exist at the RRS, further IRP investigation is recommended to locate the landfill, determine if its contents are hazardous, remove any hazardous waste and contaminated soil, and dispose of the waste according to applicable State and Federal regulations. Since an asbestos survey has been completed at Kalakaket Creek RRS, it is recommended that the identified asbestos be removed from the buildings and disposed of in accordance with appropriate state and Federal regulations.

GLOSSARY OF TERMS

ACID - A compound containing hydrogen in which all or a part of the hydrogen may be exchanged for a metal or a basic radical, forming a salt.

AGGLOMERATE - Chaotic assemblage of coarse angular pyroclastic materials; volcanic breccia.

ALBIC HORIZON - A diagnostic subsurface soil horizon from which clay and free iron oxides have been removed so that its color is determined by the sand and silt particles, and not by their coatings. It is often an A2 horizon and may form immediately beneath a layer of leaf litter.

ALBITE - A colorless or milky-white triclinic mineral of the feldspar group: $NaAlSi_3O_8$. Albite occurs in all groups of rocks, forming a common constituent of granite and of various acid-to-intermediate igneous rocks; it is widely distributed in low-temperature metamorphic rocks (greenschist facies), and is regularly deposited from hydrothermal solutions in cavities and veins.

ALLUVIAL - Pertaining to or composed of alluvium, or deposited by a stream or running water; e.g., an "alluvial clay" or an "alluvial divide."

ALLUVIAL FAN - A low, outspread, relatively flat to gently sloping mass of loose rock material, shaped like an open fan, deposited by a stream (esp. in a semiarid region) at the place where it issues from a narrow mountain valley upon a plain.

ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or running water.

ANDESITE - A dark-colored, fine-grained extrusive (volcanic) rock composed primarily of the minerals feldspar, biotite, hornblende, and pyroxene.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

ASBESTOS - A group of silicate minerals that readily form into thin, strong fibers that are flexible, heat resistant, and chemically inert; used commercially in construction.

AXIS - The line which, moved parallel to itself, generates the form of a fold.

AXIS [geomorph] - (a) The central or dominant region of a mountain chain. (b) A line that follows the trend of large landforms, such as one following the crest of a ridge or mountain range, or following the bottom or trough of a depression.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BASALT - A general term for dark-colored mafic igneous rocks, commonly extrusive but locally intrusive (e.g. as dikes), composed chiefly of calcic plagioclase and clinopyroxene; the fine-grained equivalent of *gabbro*.

BED - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDROCK - A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

BRECCIA - A coarse-grained clastic rock, composed of angular broken rock fragments held together by a mineral cement or in a fine-grained matrix.

CARBONIFEROUS - The Mississippian and Pennsylvanian periods combined, ranging from about 345 to about 280 million years ago; also the corresponding system of rocks.

CHERT - A hard, extremely dense or compact sedimentary rock.

CHLORITE - A group of platy, monoclinic, usually greenish minerals of the general formula: $(Mg,Fe^{+2},Fe^{+3})_6AlSi_3O_{10}(OH)_8$. It is characterized by prominent ferrous iron and by the absence of calcium and alkalies; chromium and manganese may be present.

COLLUVIAL - Deposited by surface runoff, usually at the base of a slope; generally any loose, heterogeneous mass of soil material deposited at the base of a slope.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CONTAMINATE - To make impure by contact or admixture.

CONTAMINATION - The act of being contaminated or the state of being contaminated.

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRETACEOUS - The final period of the Mesozoic era, thought to have covered the span of time between 135 and 65 million years ago.

CRITICAL HABITAT [Fed] - The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection; and specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

CRITICAL HABITAT [Alaska] - Places where protective emphasis is on the environment in which wildlife occurs. Critical habitats may be complete biotic systems -- identifiable environmental units that operate as self-sustaining systems -- or well-defined areas specifically needed by wildlife for certain functions such as nesting or spawning.

CRYSTALLINE - Pertaining to or having the nature of a crystal, or formed by crystallization; specifically having a crystal structure or a regular arrangement of atoms in a space lattice.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DIABASE - An intrusive rock whose main components are labradorite and pyroxene and which is characterized by ophitic texture.

DIORITE - A group of igneous rocks composed of dark-colored amphibole (esp. hornblende) oligoclase, andesine, pyroxene, and small amounts of quartz; the intrusive equivalent of andesite.

DRAG FOLD - A minor fold, usually one of a series, formed in an incompetent bed lying between more competent beds, produced by movement of the competent beds in opposite directions relative to one another. Drag folds may also develop beneath a *thrust* sheet. They are usually a centimeter to a few meters in size.

DRAINAGE CLASS - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but peridocially for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or peridocially receivehigh rainfall, or both.
Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly

drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water moves in draining an area.

ELEVATION - The vertical distance from a datum (usually mean sea level) to a point or object on the Earth's surface; esp. the height of a ground point above sea level.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of the Endangered Species Act would present an overwhelming and overriding risk to man.

ETHYLENE GLYCOL - A colorless, sweetish alcohol $C_2H_4(OH)_2$, formed by decomposing certain ethylene compounds and used as an antifreeze mixture, lubricant, etc.; a major constituent in antifreeze.

EXTRUSIVE - Igneous rock that has been erupted onto the surface of the earth, including lava flows and volcanic ash.

FAULT - A fracture or a zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture.

FLOW - Any rock deformation that is not instantly recoverable without permanent loss of cohesion. Various types of flow in which the mechanism is known include *cataclastic flow*, *gliding flow*, and *recrystallization flow*.

FOLD - A curve or bend of a planar structure such as rock strata, bedding planes, foliation or cleavage.

FRACTURE - A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress. Fracture includes cracks, joints, and faults.

GABBRO - A group of dark-colored, basic intrusive igneous rocks composed principally of basic plagioclase and clinopyroxene, with or without olivine and othoxypyrene; approximate intrusive equivalent of basalt.

GLACIAL - (a) Of or relating to the presence and activities of ice or glaciers, (b) Pertaining to distinctive features and materials produced or derived from glaciers and ice sheets.

GLACIAL TILL - See TILL.

GLAUCOPHANE - A blue, bluish-black, or grayish-blue monoclinic mineral of the amphibole group: $Na_2(Mg,Fe^{+2})_3Al_2Si_8O_{22}(OH)_2$. It is a fibrous or prismatic mineral that occurs only in certain crystalline schists resulting from regional metamorphism of sodium-rich igneous rocks.

GRANITE - Broadly applied, any crystalline, quartz-bearing plutonic rock; also commonly contains feldspar, mica, hornblende, or pyroxene.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GRAYWACKE - An old rock name that has been variously defined but is now generally applied to a dark gray firmly indurated coarse-grained sandstone that consists of poorly sorted angular to subangular grains of quartz and feldspar, with a variety of dark rock and mineral fragments embedded in a compact clayey matrix having the general composition of slate and containing an abundance of very fine-grained illite, sericite, and chloritic minerals.

GREENSTONE - A field term applied to any compact dark-green altered or metamorphosed basic igneous rock (e.g. spilite, basalt, gabbro, diabase) that owes its color to the presence of chlorite, actinolite, or epidote.

GRIT - A coarse-grained sandstone, especially one composed of angular particles; e.g. a breccia composed of particles ranging in diameter from 2 mm to 4 mm.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HILL - A natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well defined outline

(rounded) and generally considered to be less than 1,000 feet from base to summit.

IGNEOUS ROCKS - Rock or mineral that has solidified from molten or partially molten material, i.e. from a magma.

IMPERVIOUS - Incapable of being passed through, as by moisture or light rays; impenetrable.

INTRUSIVE - Magma emplaced into a pre-existing rock; the igneous rock mass so formed within the surrounding rock.

JOINT - A surface of fracture or parting in a rock, without displacement.

LIMESTONE - A sedimentary rock consisting primarily of calcium carbonate, primarily in the form of the mineral calcite.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

LOESS - A widespread, homogeneous, commonly nonstratified, porous, friable, slightly coherent, usually highly calcareous, fine-grained blanket deposit (generally less than 30 inches thick).

METAMORPHIC ROCK - Any rock derived from pre-existing rocks by minerological, chemical, and/or structural changes, essentially in solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the Earth's crust.

METAMORPHOSED - Any change in form, structure, substance, etc.

MICA - A group of minerals of general formula $(K,Na,C)(Mg,Fe,Li,Al)_{2-3}(Al,Si)_4O_{10}(OH,F)_2$. Micas are prominent rock-forming constituents of igneous and metamorphic rocks, and commonly occur as flakes, scales, or shreds.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MORAINE - A mound, ridge, or other distinct accumulation of unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice, in a variety of topographic landforms that are independent of control by the surface on which the drift lies.

NATURAL AREA - An area of land or water that has retained its wilderness character, although not necessarily completely natural and undisturbed, or that has rare or vanishing flora, fauna, archaeological, scenic, historical, or similar features of scientific or educational value.

OTTRELITE - A gray to black variety of chloritoid containing manganese.

OVERTURNED - Said of a fold or the limb of a fold, that has tilted beyond the perpendicular sequence of strata thus appears reversed.

PALEOZOIC - An era of geologic time, from the end of the Precambrian to the beginning of the Mesozoic, or from 570 to about 225 million years ago.

PARK - An area of public land known for its natural scenery and preserved for public recreation by a State or national government.

PCBs - See POLYCHLORINATED BIPHENYLS.

PD-680 - A cleaning solvent composed predominately of mineral spirits; Stoddard solvent.

PEAK - (a) The more or less conical or pointed top of a hill or mountain; one of the crests of a mountain; a prominent summit or the highest point. (b) An individual mountain or hill taken as a whole, especially when isolated or having a pointed, conspicuous summit.

PEAT - An unconsolidated deposit of semicarbonized plant remains in a water-saturated environment and of persistently high moisture content (at least 75%).

PERMAFROST - Any soil, subsoil, or other surficial depost, or even bedrock, occurring in arctic, subarctic, and alpine regions at a variable depth beneath the Earth's surface in which a temperature below freezing has existed continuously for a long time (from two years to tens of thousands of years).

PHYLLITE - A metamorphosed rock, intermediate in grade between slate and mica schist. Minute crystals of sericite and chlorite impart a silky sheen to the surfaces of cleavage (or schistosity). Phyllites commonly exhibit corrugated cleavage surfaces.

PLUNGE - The indication of a fold or other linear structure measured in the vertical plane. It is mainly used for the geometry of folds.

PLUTON - An igneous intrusion.

POLYCHLORINATED BIPHENYLS (PCBs) - A family of aromatic hydrocarbons in which chlorine atoms have replaced the hydrogen atoms in biphenyl rings. At least 100 different compounds are known as PCBs; these differ in their toxic effects as well as in their chemical and physical properties. PCBs were widely used as insulating fluids in electrical transformers and capacitors.

PRECAMBRIAN - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic; it is equivalent to about 90% of geologic time.

PRESERVE - An area maintained and protected especially for regulated hunting and fishing.

PRISTINE - Something that is still pure or untouched; uncorrupted; unspoiled.

PYROXENITE - An ultramafic plutonic rock chiefly composed of pyroxene, with accessory hornblende, biotite, or olivine.

QUARTZ - A crystalline silica, an important rock forming mineral: SiO_2. Occurs either in transparent hexagonal crystals (colorless or colored by impurities or in crystalline. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUARTZITE - A granoblastic metamorphic rock consisting mainly of quartz and formed by recrystallization of sandstone or chert by either regional or thermal metamorphism.

QUATERNARY - The second period of the Cenozoic era, following the Tertiary: it began 3 to 2 million years ago and extends to the present.

RECENT - An epoch of the Quaternary period which covers the span of time from the end of the Pleistocene epoch, approximately 8 thousand years ago, to the present. Also called the Holocene epoch.

RECHARGE AREA - An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers.

RELIEF - (a) A term used loosely for the physical shape, configuration, or general unevenness of a part of the Earth's surface, considered with reference to variations of height and slope or to irregularities of the land surface; the elevations of differences in elevation, considered collectively, of a land surface.

RHYOLITE - A group of extrusive igneous rocks, typically porphyritic and commonly exhibiting flow texture, with phenocrysts of quartz and alkali feldspar in a glassy to cryptocrystalline groundmass; also, any rock in that group; the extrusive equivalent of *granite*.

RIDGE - A general term for a long, narrow elevation of the Earth's surface, usually sharp-crested with steep sides, occurring either independently or as part of a larger mountain or hill.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

ROCK - An aggregate of one or more minerals; or a body of undifferentiated mineral matter or of solid organic material.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2 mm.

SANDY LOAM - A soil containing 43 - 85% sand, 0 - 50% silt, and 0 - 20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30, or containing 43 - 52% sand, less than 50% silt, and less than 7% clay.

SCARP - A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of *escarpment*, and the two terms commonly have the same meaning, although "scarp" is more often applied to cliffs formed by faulting.

SCHIST - A medium or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

SCHISTOCITY - The foliation in schist or other coarse-grained, crystalline rock due to the parallel, planar arrangement of mineral grains of the platy, prismatic, or ellipsoidal types, usually mica.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (esp. by compression) of clay, silt, or mud.

SHEAR ZONE - A tabular zone of rock that has been crushed and brecciated by many parallel fractures due to shear strain.

SILT [geol] - A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 0.004 to 0.063 mm.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002 to 0.005 mm; (b) A soil containing more than 80 percent silt-size particles, less than 12 percent clay, and less than 20 percent sand.

SILT LOAM - A soil containing 50 to 88 percent silt, 0 to 27 percent clay and 0 to 50 percent sand.

SLATE - A compact, fine-grained metamorphic rock that possesses slaty cleavage and hence can be split into slabs and thin plates. Most slate was formed from shale.

SLOPE - (a) Gradient; (b) The inclined surface of any part of the Earth's surface.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	- less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	- 0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	- 0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)

Moderate	- 0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)
Moderately Rapid	- 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)
Rapid	- 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)
Very Rapid	- more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

SOLVENT - A substance, generally a liquid, capable of dissolving other substances.

SPODIC HORIZON - A soil horizon that is characterized by the illuvial accumulation of black or reddish amorphous materials that have a high cation-exchange capacity and consist of alluminum and organic carbon, sometimes with iron.

STRATIGRAPHIC UNIT - A stratum or body of adjacent strata recognized as a unit in the classification of a rock sequence with respect to any of the many characters, properties, or attributes that rocks may possess, for any purpose such as description, mapping, and correlation.

STRIKE-SLIP FAULT - A fault on which the movement is parallel to the fault's strike.

STREAM - Any body of running water that moves under gravity to progressively lower levels, in a relatively narrow but clearly defined channel on the surface of the ground; smaller than river; Syn : brook.

SURFACE WATER - All waters on the surface of the Earth, including fresh and saltwater, ice and snow.

TERTIARY - The first period of the Cenozoic era, thought to have covered the span of time between 65 and 3 to 2 million years ago.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TILL - Dominantly unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by meltwater, and consisting of a heterogenous mixture of clay, silt, sand and gravel and boulders ranging widely in size and shape

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

TRICHLOROETHANE - A colorless, volatile chlorinated halogen which is used for drycleaning purposes.

TUFF - A general term for all consolidated pyroclastic rocks.

VALLEY - Any low-lying land boardered by higher ground, esp. an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

VOLCANIC - Igneous rocks that have reached the earth's surface before solidifying; generally finely crystalline or glassy.

WETLANDS - Are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of the Classification of Wetlands and Deepwater Habitats of the United States, wetlands must have one or more of the following three attributes: (1) at least periodically , the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

WILDERNESS AREA - An area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter of the Wilderness Act, an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or an primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic or historical value.

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APPENDIX A

RESUMES OF PRELIMINARY ASSESSMENT TEAM MEMBERS

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., Mechanical Engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Thirty years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over seven years of logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years of experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Senior Engineer

Responsible for activities relating to Phases I, II and IV of the U.S. Air Force Installation Restoration Program including records search, review and evaluation of previous studies, preparation of statements of work, feasibility studies, preparation of remedial action plans, designs and specifications, and review of said studies/plans to ensure that they are in conformance with requirements.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor tn American industry interested in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75 million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member., Florida Engineering Society
Member, Project Management Institute

HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, dBASE III, Framework, Project Scheduler 5000, Harvard Project Manager, Volkswriter

BETSY A. BRIGGS

EDUCATION

B.S., Biology and Chemistry, State University College of New York at Cortland, 1979

Completed several courses in M.B.A. program, University of Phoenix, Denver, Colorado Division, 1984

SPECIALIZED TRAINING

Hazardous Waste Management course, Air Force Institute of Technology, 1986

CERTIFICATION

Certified Hazardous Materials Manager, Institute of Hazardous Materials Management, 1985

SECURITY CLEARANCE

Secret/DOE

EXPERIENCE

Nine years of experience including three years in hazardous waste management, two years as an environmental engineer, two years as an ecologist, and two years in laboratory research. Has conducted ambient air quality monitoring programs, critical pathways projects to study movement of radioactive materials in the environment, metallurgic laboratory analyses, and independent studies in biology and chemistry. Currently provides managerial oversight and technical support to a hazardous waste program for the Air Force.

EMPLOYMENT

Dynamac Corporation (1985-present): Program Manager/Hazardous Waste Specialist

Primary responsibility as program manager is to oversee and manage up to 44 field personnel involved in RCRA and CERCLA work in support of the U.S. Air Force. Other duties include performing preliminary assessments/site surveys for the Air National Guard, marketing and proposal preparation, and preparing and providing training in preparation for the Certified Hazardous Materials Manager examination.

As hazardous waste specialist the primary responsibility was to manage the hazardous waste program at Myrtle Beach Air Force Base. Duties included:

- Reviewing the design and specifications of various base construction projects and overseeing such projects to ensure compliance with all applicable state and federal hazardous waste regulations. Projects under design included a corrosion control facility, TSD facility, two accumulation points, and a parts cleaning vat system. Construction project oversight included the final inspection of the entomology building to ensure that the facility was equipped for proper storage, usage and disposal of pesticides; removal of materials contaminated with pesticides, PCBs, petroleum products, and solvents from six sites; asbestos removal and disposal from a former hangar site; and the removal of two underground storage tanks, one of which was leaking.
- Conducting surveys of hazardous waste generating activities.
- Advising on need for and methods of minimizing hazardous waste generation.
- Writing and maintaining hazardous waste management plan.
- Preparing hazardous waste management reports and documents required by state and federal law.
- Maintaining liaison with federal and state regulatory agencies on matters involving criteria, standards, performance specifications, and monitoring.
- Providing information and technical consultation to Air Force installation staff regarding hazardous materials and hazardous waste operations.
- Serving as ad hoc advisor to environmental contingency response teams.

Rockwell International (1982-1984): Environmental Engineer

Primary responsibility was collection, evaluation, and reporting of ambient air monitoring data. Other responsibilities included technical assistance for monitoring total suspended solids in ambient air. Also performed data collection and reduction of air effluent emission control activities.

Environmental monitoring and control programs are to ensure that all Department of Energy and other governmental effluent regulations are met, and that plant effluents are consistent with the As Low As Reasonably Achievable (ALARA) Principle. Monthly and Annual Reports summarize the effluent and environmental monitoring programs.

Rockwell International (1980-1982): Ecologist

Responsible for planning, organizing, and leading critical pathways projects designed to study the movement of radioactive materials throughout the environment. Projects were: (1) general critical pathway evaluation to identify

sampling points possibly not considered in present monitoring program; (2) plant uptake versus plant uptake plus foliar deposition measurement study; (3) deer tissue analysis program; and (4) food stuff monitoring program. Progress and results were published in semiannual reports.

Colorado School of Mines Research Institute, Texas Gulf Research Laboratory (1979-1980): Senior Laboratory Technician

Work involved quantitative analysis of platinum, palladium, and silver in soil samples. Analysis included sample preparation, fire assays, calorimetric procedures, and smelt tests.

State University College of New York at Cortland (1978-1979): Undergraduate Independent Study

Project involved the isolation of trail pheromone from spun silk of *Hyphantria* (fall webworm). Included organic and inorganic extraction procedures and performing bioassays. Also worked on production of synthetic diet comparable to fresh leaf diet for *Malacosomo* (eastern tent caterpillar).

PUBLICATIONS

Hazardous Waste Management Survey for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1986 and 1988.

Hazardous Waste Management Plan for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1987 and 1988.

Waste Minimization Guidance for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1988.

Underground Storage Tank Management Plan for Myrtle Beach Air Force Base, Hazardous Materials Technical Center, Rockville, Maryland, 1988.

Annual Environmental Monitoring Report, Rockwell International, Energy Systems Group, Rocky Flats Plant, 1982 and 1983.

Environmental Studies Group Semiannual Report, Rockwell International, Energy Systems Group, Rocky Flats Plant, June/December of 1980 and 1981.

TECHNICAL PRESENTATIONS

PCB Management, Myrtle Beach Air Force Base, 1987.

Underground Storage Tank Regulations/History, Myrtle Beach Air Force Base, 1986.

Overview of the Hazardous Waste Training Program, Myrtle Beach Air Force Base, 1985.

Overview of the Environmental Studies Group, Nevada Test Site and Rockwell International at Hanford, Washington, 1981.

NATASHA M. BROCK

EDUCATION

Graduate work, Civil/Environmental Engineering, University of Maryland, 1987-present

Graduate work, Civil/Environmental Engineering, University of Delaware, 1985-1986

B.S. (cum laude), Environmental Science, University of the District of Columbia, 1984

A.A.S., Marine Science, University of the District of Columbia, 1984

Undergraduate work, Biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Three and a half years of experience in the environmental and hazardous waste field. Work performed includes remedial investigations/feasibility studies, RCRA facility assessments, comprehensive monitoring evaluations, and remedial facility investigations. Helped develop and test biological and chemical processes used in minimization of hazardous and sanitary waste generation. Researched multiple substrate degradation using aerobic and anaerobic organisms.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Prepares Hazardous Waste Management Plans for the Coast Guard and Preparedness, Prevention, and Contingency Plans for the Air Force Reserve. Prepared standard operating procedure manual for quick remedial response to site spills and releases, and PA/RI/FS. Performed oversight tasks at a drum site cleanup. Also responds to spills/releases by providing consultation on cleanup and monitoring.

C.C. Johnson & Malhotra, P.C. (1986-1987): Environmental Scientist

Involved as part of a team in performing Remedial Investigations/Feasibility Studies (RI/FS) for EPA Regions I and IV under Resource Conservation and Recovery Act (RCRA) work assignments for REM II projects. Participated on a team involved in RCRA Facility Assessments (RFAs), Comprehensive Monitoring Evaluations (CMEs), and Remedial Facility Investigations (RFIs) for

EPA work assignments under RCRA for REM III projects in Regions I and IV. Work included solo oversight observations of field sampling and facility inspections. Additional responsibilities included promotion work, graphic layout, data entry-quality check for various projects. Certified Health & Safety Training Level C.

<u>Work Force Temporary Services (1985-1986)</u>: Research Scientist

In working for DuPont's Engineering Test Center, helped in the development and testing of laboratory-scale biological and chemical processes for a division whose main purpose was to reduce the amount of hazardous waste generated. Also worked for Hercules, Inc., with a group involved in polymer use for wastewater treatment for clients in various industrial fields. Specifically involved in product consultation, troubleshooting, and product development.

<u>National Oceanic and Atmospheric Administration (1982-1984)</u>: Research Assistant

Involved with an information gathering and distribution center of weather impacts worldwide. Specifically involved in data collection, distribution of data to clients, assessment production and special reports.

HARDWARE

IBM PC, COMPAC PC, Apple IIe, Commodore, Toshiba Laptop

SOFTWARE

Lotus 1-2-3, FormTool

LAWRENCE E. GLADSTONE

EDUCATION

B.S., Geophysics, Virginia Polytechnic Institute & State University, 1985

SPECIALIZED TRAINING

Completed 40-hour course "Health and Safety Training for Hazardous Waste Activities" in accordance with OSHA training requirements (29 CFR 1910.120).

EXPERIENCE

Two years of experience as junior staff scientist for the Hazardous Materials Technical Center of Dynamac Corporation. Experience in hazardous waste management includes conducting Phase I records searches for the Air National Guard's Installation Restoration Program, auditing records of hazardous waste management firms awarded disposal contracts by DOD, and preparing RCRA Part B permits for the Defense Logistics Agency (DLA).

EMPLOYMENT

Dynamac Corporation (1986-present): Junior Staff Scientist

Performs preliminary assessments of suspected hazardous waste sites at Air National Guard bases under Phase I of the Installation Restoration Program. Duties include searching available records, interviewing past and present employees, observing current waste management practices, and investigating identified sites.

Prepares Part B permit applications for hazardous waste storage facilities operated by DLA and the U.S. Coast Guard. Conducts site visits at installations and collects site-specific information from the hazardous waste management facility. Assimilates data into permit application with regard to general facility, waste analyses, process descriptions, groundwater monitoring, site safety and security, contingency plans, personnel training, closure and postclosure plans, and other appplicable federal laws concerning the environment. Responds to client comments and EPA Notice of Deficiencies.

Prepared Air Force's response to EPA CERCLA 104(e) letters regarding wastes generated by Luke and Altus Air Force Bases which may have been disposed at landfill facilities subsequently identified as Superfund sites requiring remedial action.

Developed closure maintenance plans for landfill cells at Edwards Air Force Base.

Conducted surveillance of hazardous waste contractors for DLA. Responsibilities included auditing waste records, tracking fate of disposed items, and monitoring contractor operations.

Assisted in development of data base designed to reveal disposal costs of waste generated at Defense Reutilization and Marketing Offices.

U.S. Geological Survey (part-time, 1983-1985): Cartographic Aide

Assisted in quality control process of printing and distributing 7.5-minute topographic maps. Checked and corrected map separate registration, prepared negative and positive overlays for alignment, and prepared photographic service requests.

DAVID R. HALE

EDUCATION

B.S., Civil Engineering, Virginia Polytechnic Institute, 1978

SPECIALIZED TRAINING

Groundwater Remediation Course, National Water Well Association, 1986
Contract Supervisor School, CBI Industries, 1981

CERTIFICATION

Engineer-in-Training Certificate, State of Virginia, 1978

EXPERIENCE

Ten years' experience in a wide variety of engineering planning, design and management, environmental assessment and remediation, project and construction management, as well as research and development activities related to new and innovative technologies. Experience includes involvement in small-, medium- and large-scale environmental and civil projects, and includes project conception, design, implementation, construction and management activities. Extensive experience in the development, design and management of projects involving several interdisciplinary fields of engineering, sciences, and business. Proficiency in a wide variety of computer systems and usage, including mainframe and microcomputers as well as CAD systems.

EMPLOYMENT

Dynamac Corporation (1987-present): Manager of Engineering

Responsible for the engineering management of various environmental consulting engineering and technical services in the Dayton regional office. Responsibilities include the planning, development, and execution of engineering and technical services for environmental projects such as hazardous waste site investigations and remediation, asbestos assessment and abatement, RCRA permitting, monitoring and compliance, industrial hygiene and training, as well as other environmental matters.

DETOX, Inc. (1986): Manager, Technical Services

Responsible for the overall development, design, project management and implementation of various groundwater remediation projects, as well as several specialized wastewater treatment systems. Heavy emphasis on the conceptual development and design engineering related to innovative biological treatment techniques, equipment and systems, as well as multiunit process water and

wastewater treatment systems. Staff management responsibilities included supervision of engineering, procurement, and large-scale project management functions, as well as direct involvement in project marketing, corporate computer and CAD operations, and company R&D efforts.

DETOX, Inc. (1985-1986): Eastern Regional Manager

As regional manager for the eastern United States, responsibilities included the overall marketing, sales, and project management for groundwater remediation and industrial wastewater projects in this area. Efforts resulted in establishing a widespread customer interest base for the groundwater treatment equipment and technical services offered by DETOX, as well as sale and management of several substantial and innovative remediation projects. Instituted corporatewide microcomputer-based CAD and project management systems.

CBI Industries, Inc. (1981-1985): Project Engineer

As part of a new Water Technology Development venture group (1984-1985), involved in actively researching, seeking, and implementing for CBI new and innovative technologies and business lines. Responsibilities included acquisition research, engineering and financial analysis and assessment, market research, and business development. Two new business line developments resulted in $15 million to $20 million in annual revenues. Actively pursued several new business areas for CBI, including the privitization of municipal water and wastewater facilities, and sewage sludge composting. Initiated CBI interest in co-development of a new, innovative flue gas treatment technology for reducing acid-rain-causing emissions from fossil fuel combustion processes. Awarded one patent, with two pending applications, as a result of activities in the Water Technology group.

Project engineer assigned to various CBI Industries engineering departments (Special Structures, Standard Structures, and Marine Structures) (1981-1984); involved in the design and analysis of several substantial projects. These included the conception and design of two new and innovative offshore oil exploration drilling structures for use in Alaskan Arctic waters, with a patent award for one concept. Responsible for the external structural analysis and design on CBI's largest ever project, a turnkey LGN/LPG facility in excess of $350 million.

CBI Industries, Inc. (1979-1981): Project Engineer/Field Engineer

Assigned to CBI's Saudi Arabian construction subsidiary (Arabian CBI); worked as project and field engineer on several substantial field construction projects, including two refinery tankage terminals (a total of 120 petroleum tanks) and several refinery vessels and miscellaneous structures. Involved in the day-to-day management of large-scale field construction projects, including the close supervision and management of large numbers of field employees from several diverse nationalities. Responsible for the field engineering aspects of large petrochemical projects, including field layout, surveying, and erection supervision.

CBI Industries, Inc. (1978-1979): Engineer Trainee

Worked at CBI's Delaware Engineering Office and Pennsylvania Manufacturing Plant as part of CBI's Engineer Advancement Program. Duties included familiarization with CBI procedures related to detail engineering and manufacturing, as well as hands-on training in such areas as welding, fabrication, and engineering drawing.

PUBLICATIONS

Hale, D.R., and E.K. Nyer. 1986. Two Years of Operation of a Groundwater Treatment System, Proceedings of the 1986 ASCE National Conference on Environmental Engineering.

Hale, D.R., et al. Physical/chemical in-situ treatment techniques. Chapter 10 in: In-situ Treatment Technology (in press).

TECHNICAL PRESENTATIONS

Instructor on Groundwater Treatment Technology, 1986 Aquifer Remediation Course Series presented by the National Water Well Association

Instructor on Groundwater Treatment Technology, 1986 HazPro Professional Certification Symposium

JANET SALYER EMRY

EDUCATION

M.S., Geology, Old Dominion University, 1987
B.S. (cum laude), Geology, James Madison University, 1983

EXPERIENCE

Three years of technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis. Experienced in addressing technical and public audiences concerning hazardous waste site risks and proposed remedial actions.

EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include technical and public forum support for Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Assists site personnel in the communication of risk evaluations to the surrounding community.

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

MARK D. JOHNSON

EDUCATION

B.S., Geology, James Madison University, 1980

EXPERIENCE

Experienced in interviewing site personnel and local communities to determine history and location of hazardous waste sites. Six years of technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force and the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist/Geologist

Conducts interviews with site personnel and local communities to determine locations and history of hazardous waste sites. Responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program, statements of work for Phase II and Phase IV-A of the Air National Guard's Installation Restoration Program, and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for developing remedial investigations and identifying remedial actions. Prepared guidance document for the Air Force's Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
British Tunneling Society

PUBLICATIONS

Eaton, W.D., and M.D. Johnson. Navy Assessment and Control of Installation Pollutants Confirmation Study for sites 1,3,5, and 9 at the Naval Weapons Support Center, Crane, Indiana. November 1984.

Peters, G.O., Jr., and M.D. Johnson. Air Force Installation Restoration Program Management Guidance. July 1985.

Telesca, D.R., and M.D. Johnson. Statement of Work for Phase IV-A-Remedial Action Plan Installation Restoration Program, MacDill Air Force Base, Hillsborough County, Florida. June 1985.

Johnson, M.D. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, Homestead Air Force Base, Florida. October 1985.

Johnson, M.D. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, McChord Air Force Base, Washington. May 1985.

Johnson, M.D. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, Norton Air Force Base, California. October 1985.

Johnson, M.D. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, Holloman Air Force Base, New Mexico. January 1986.

Johnson, M.D., et al. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program for Landfill No. 4 and Sludge Lagoon at Robins Air Force Base, Georgia. January 1986.

Johnson, M.D. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, Eielson Air Force Base, Alaska. March 1986.

Johnson, M.D., and L.R. Venkateshwara. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, for Golf Course Trench Landfill and Hillside Dump Area at Sunset Hill Golf Course, Olmsted Air Force Base, Pennsylvania. March 1986.

Johnson, M.D., and L.R. Venkateshwara. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program for Sites 1, 2, 3, and 4 at Goodfellow Air Force Base, Texas. June 1986.

Johnson, M.D., and L.R. Venkateshwara. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program for Eleven Hazardous Waste Disposal/Spill Sites at Vance Air Force Base, Oklahoma. June 1986.

Johnson, M.D., and R. Hebert. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program, Castle Air Force Base, California. June 1986.

Johnson, M.D., and L.R. Venkateshwara. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program for North Drainage Ditch and Liquid Waste Site at Dover Air Force Base, Delaware. May 1986.

Holsinger, J., G.O. Peters, M.D. Johnson, et al. Siting Options Report, DRMO Stocton, Conforming Storage Facility. October 1985.

Johnson, M.D., and L.R. Venkateshwara. Statement of Work for Phase IV-A Remedial Action Plan Installation Restoration Program for Sites 5, 7, and 39 at McChord Air Force Base, Washington. April 1986.

Johnson, M.D., E. Dias, and W.D. Eaton. Statement of Work for Phase II/IV-A Site Characterization/Remedial Action Plan Installation Restoration Program for Sites 1, 2, 5, and 6 at Idaho Air National Guard Base, Boise, Idaho. June 1986.

Johnson, M.D., and D. Lipksky. Statement of Work for Phase II/IV-A Site Characterization/Remedial Action Plan Installation Restoration Program for Fire Department Training Area at Suffolk County Air National Guard Base, Westhampton Beach, New York. June 1986.

Johnson, M.D. Statement of Work for Phase II/IV-A Site Characterization/Remedial Action Plan for Pesticide Burial Site and Landfill at Stewart Air National Guard Base, Newburgh, New York. April 1986.

Johnson, M.D., and A. Peters. Statement of Work for Phase II/IV-A Site Characaterization/Remedial Action Plan for Unused Underground Storage Tanks at Greater Wilmington Air National Guard Base, Wilmington, Delaware. March 1986.

APPENDIX B

OUTSIDE AGENCY CONTACT LIST

OUTSIDE AGENCY CONTACT LIST

Alaskan Department of Environmental Conservation
3601 C Street, Suite 1350
Anchorage, AK 99508
Bruce Erickson and James Hayden, (907) 563-6529

Arctic Environmental Information and Data Center
University of Alaska - Fairbanks
707 A Street
Anchorage, AK 99501
L.D. Leslie, (907) 279-4523

National Oceanic and Atmospheric Administration
6001 Executive Boulevard
Rockville, MD 20853

National Oceanic and Atmospheric Administration
701 C Street, Box 38
Anchorage, AK 99513
(907) 271-5040

State of Alaska Department of Natural Resources
Division of Geological and Geophysical Surveys
3700 Airport Way
Fairbanks, AK 99709-4609
Mark Robinson (907) 474-7147

U.S. Fish and Wildlife Services
1011 East Tudor Road
Anchorage, AK
Ronald Garrett, (907) 786-3435

U.S. Fish and Wildlife Service
1412 Airport Way
Fairbanks, AK 99701-8524
R.E. (Skip) Ambrose, (907) 456-0239

U.S. Geological Survey
354 Middlefield Road
Menlo Park, CA 94025
Bill Patten, 1-800-521-6586

U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
(703) 648-4000

U.S. Geological Survey
4200 University Drive
Anchorage, AK 99508
Oscar J. Ferrians, Jr., (907) 561-1181

U.S. Soil Conservation Service
201 East 9th Avenue, Suite 300
Anchorage, AK
(907) 271-2424

U.S. Soil Conservation Service
East Fireweed Avenue
Palmer, Alaska 99645
Joe Moore, (907) 745-4274

APPENDIX C

USAF HAZARD ASSESSMENT RATING METHODOLOGY AND GUIDELINES

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Preliminary Assessment phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contaminant migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site the the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three stages. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	5
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records

Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200° F	Flash point at 140° F to 200° F	Flash point at 80° F to 140° F	Flash point less than 80° F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. **WASTE CHARACTERISTICS**--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. **Persistence Multiplier for Point Rating**

Multiply Point Rating Persistence Criteria	From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. **Physical State Multiplier**

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground-Water Contamination -Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX D

5099th CEOS PCB TEST RESULTS

OCTOBER 1984 KALAKAKET CREE WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLES TESTED

TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
11	4 OCT 84, NEW OIL, NORTH-EAST END OF AIRSTRIP (DRUMS)	108	9	22
12	" USED OIL " " " " " "	-182	>1046	>1815
13	" " " " " " " "	-170	>1046	>1815
14	" " " " " " " "	18	303	868
15	" " " " " " " "	-108	>1046	>1815
16	" " " " " " " "	-15	>1046	>1815
17	" " " " " " " "	-44	>1046	>1815
18	" " " " " " " "	-19	>1046	>1815
19	" " " " " " " "	+18	303	868
20	" " " " " " " "	28	205	576
21	" " " " " " " "	-102	>1046	>1815
22	" " " " " " " "	92	17	42
23	" " " " " " " "	-57	>1046	>1815
24	" " " " " " " "	-158	>1046	>1815
25	" " " " " " " "	-37	>1046	>1815
1	5 OCT 84, " " " " " " "	28	205	576
2	" " " " " " " "	147	<4	<9
3	" " " " " " " "	15	340	482
4	" " " " " " " "	6	482	1420
5	" " " " " " " "	90	19	45
6	" " " " " " " "	-36	>1046	>1815
7	" " " " " " " "	-106	>1046	>1815
8	" " " " " " " "	-39	>1046	>1815
9	" " " " " " " "	-10	896	>1815
10	" " " " " " " "	-3	684	>1815
11	" " " " " " " "	16	327	942
12	" " " " " " " "	-113	>1046	>1815
13	" " " " " " " "	-54	>1046	>1815
14	" " " " " " " "	-85	>1046	>1815
15	" " " " " " " "	34	163	450
16	" " " " " " " "	32	176	489
17	" " " " " " " "	-70	>1046	>1815

OCTOBER 1984 KALAKAKET CR - WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLES TESTED

TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
18	5 OCT 84, USED OIL, NORTH-EAST END OF AIRSTRIP (DRUMS)	-91	>1046	>1815
19	" " " " " " "	34	163	450
20	" " " " " " "	-81	>1046	>1815
21	" " " " " " "	28	205	576
22	" " " " " " "	-86	>1046	>1815
23	" " " " " " "	4	521	1540
24	" " " " " " "	-145	>1046	>1815
25	" " " " " " "	-74	>1046	>1815
1	6 OCT 84, SOIL, SOUTH SIDE OF POWER PLANT TOP CAMP	138	<16	<36
2	" " " " " " " " "	110	<36	80
3	" " " " " " " " "	89	78	187
4	" " " " " " " " "	144	<16	<36
5	" " " " " " " " "	148	<16	<36
6	" " " " " " " " "	142	<16	<36
7	" " " " " " " " "	154	<16	<36
8	" " " " " " " " "	157	<16	<36
9	" " " " " " " " "	155	<16	<36
10	" " " " " " " " "	149	<16	<36
11	" " " " " " " " "	154	<16	<36
12	" " " " " " " " "	157	<16	<36
13	" " " " " " " " "	148	<16	<36
14	" " " " " " " " "	155	<16	<36
15	" " " " " " " " "	151	<16	<36
16	" " " " " " " " "	154	<16	<36
17	" NEW & UN-OPENED 5gal CAN OF TRANSFORMER OIL	-111	>1046	>1815
1	7 OCT 84, SOIL, CONTAMINATED AREA-TOP CAMP, DURING REMOVAL	144	<16	<36
2	" " " " " " " "	150	<16	<36
3	" " " " " " " "	15	340	982
4	" " " " " " " "	150	<16	<36
5	" " " " " " " "	145	<16	<36
6	" " " " " " " "	160	<16	<36
7	" " " " " " " "	110	36	80

OCTOBER 1984 KALAKAKET CR. WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLES TESTED

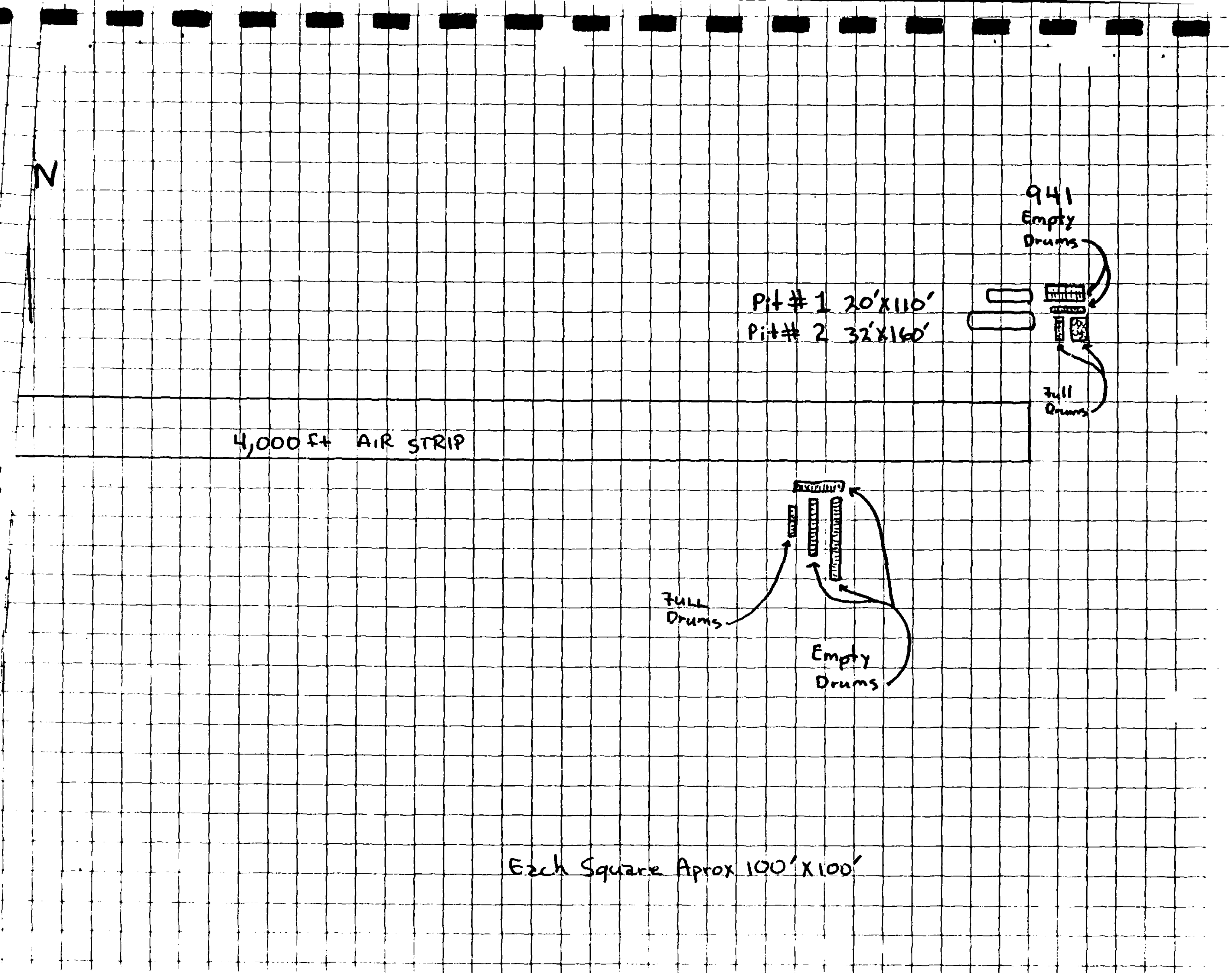
TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
8	7 OCT 84, SOIL, CONTAMINATED AREA-TOP CAMP, DURING REMOVAL	134	<16	<36
9	" " " " " " AFTER "	143	<16	<36
1	" " AROUND OIL DRUMS SOUTH-EAST OF AIRSTRIP	148	<16	<36
2	" " " " " " " "	140	<16	<36
3	" " " " " " " "	65	196	506
4	" " " " " " " "	134	<16	<36
5	" " " " " " " "	138	<16	<36
6	" " " " " " " "	131	<16	<36
7	" " " " " " " "	149	<16	<36
8	" " " " " " " "	145	<16	<36
1	8 OCT 84, " " " " " " "	87	84	206
2	" " " " " " " "	147	<16	<36
3	" " " " " " " "	154	<16	<36
4	" " " " " " " "	139	<16	<36
5	" " " " " " " "	143	<16	<36
6	" " " " " " " "	78	120	296
1	9 OCT 84, OIL (USED), NORTH-EAST END OF AIRSTRIP	137	< 4	< 9
2	" " " " " "	6	482	1420
3	" " " " " "	51	85	225
4	" " " " " "	105	11	24
5	" " " " " "	8	446	1308
6	" " " " " "	99	14	32
7	" " " " " "	140	< 4	< 9
8	" " " " " "	-10	896	>1815
9	" " " " " "	48	95	254
10	" " " " " "	43	115	312
11	" " " " " "	94	16	39
12	" " " " " "	60	59	155
13	" " " " " "	143	< 4	< 9
14	" " " " " "	49	92	244
15	" " " " " "	93	17	41
16	" " " " " "	4	521	1540

OCTOBER 1984 KALAKAKET C K WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLES TESTED

TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
17	9 OCT 84, USED-OIL, NORTH-EAST END OF AIRSTRIP	136	<4 [redacted]	< 9
18	" " " " " "	46	102 [redacted]	275
19	" " " " " "	44	111	299
20	" " " " " "	27	214	601
21	" " " " " "	-259	>1046	>1815
22	" " " " " "	83	24	61
23	" " " " " "	-129	>1046	>1815
24	" " " " " "	128	4	10
25	" " " " " "	122	5	12
26	" " " " " "	25	231	652
27	" " " " " "	59	62	162
28	" " " " " "	48	95	254
29	" " " " " "	-20	>1046	>1815
30	" " " " " "	115	7	17
31	" " " " " "	-21	>1046	>1815
32	" " " " " "	-58	>1046	>1815
33	" " " " " "	-4	710	>1815
34	" " " " " "	-12	968	>1815
35	" " " " " "	88	20	49
36	" " " " " "	140	< 4	< 9
1	" SOIL, NORTH-EAST OF AIRSTRIP, DURING REMOVAL	119	24	56
2	" " " " " " "	129	16	40
3	" " " " " " "	135	<16	<36
4	" " " " " " "	70	160	412
5	" " " " " " "	141	<16	<36
6	" " " " " AFTER "	126	20	40
7	" " IN OVERPACK AFTER REMOVAL	90	76	180
1	10 OCT 84, USED-OIL, NORTH-EAST OF AIRSTRIP	-148	>1046	>1815
2	" " " " "	-96	>1046	>1815
3	" " " " "	-89	>1046	>1815
4	" " " " "	-137	>1046	>1815
5	" " " " "	-86	>1046	>1815

OCTOBER 1984 KALAKAKET CR K WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLE, TESTED

TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
1	1 OCT 84, SOIL, MAIN BLDG. TOP CAMP	142	<16	<36
2	" " " " " "	144	<16	<36
3	" " " " " "	58	256	672
4	" " " " " "	152	<16	<36
5	" " " " " "	158	<16	<36
6	" " " " " "	161	<16	<36
1	3 OCT 84 " AROUND DRUMS STOCKPILED AT AIRSTRIP	134	<16	<36
2	" " " " " " "	150	<16	<36
3	" " " " " " "	138	<16	<36
4	" " " " " " "	134	<16	<36
5	" " " " " " "	132	<16	<36
6	" " " " " " "	138	<16	<36
7	" " " " " " "	147	<16	<36
8	" " " " " " "	143	<16	<36
9	" " " " " " "	140	<16	<36
10	" " " " " " "	135	<16	<36
11	" " " " " " "	168	<16	<36
12	" " " " " " "	75	134	336
13	" " " " " " "	72	148	380
14	" " " " " " "	148	<16	<36
15	" " " " " " "	140	<16	<36
16	" " " " " " "	146	<16	<36
1	4 OCT 84, NEW OIL, NORTH-EAST END OF AIRSTRIP (DRUMS)	37	145	398
2	" " " " " " " " "	-187	>1046	>1815
3	" " " " " " " " "	-70	>1046	>1815
4	" " " " " " " " "	122	5	12
5	" " " " " " " " "	-202	>1046	>1815
6	" " " " " " " " "	108	9	22
7	" " " " " " " " "	-331	>1046	>1815
8	" " " " " " " " "	-78	>1046	>1815
9	" " " " " " " " "	-134	>1046	>1815
10	" " " " " " " " "	-201	>1046	>1815


N
941
Empty
Drums
Pit # 1 20'X110'
Pit # 2 32'X160'
Full
Drums
4,000 ft AIR STRIP
Full
Drums
Empty
Drums
Each Square Aprox 100'X100'

OCTOBER 1984 KALAKAKET CEK WHITE ALICE STATION
RECORD OF SOIL & OIL SAMPLES TESTED

TEST	DATE, SUBSTANCE, LOCATION	MV	PPM 1260	PPM 1242
6	10 OCT 84, USED-OIL, NORTH-EAST OF AIRSTRIP	-14	>1046	>1815
7	" " " " "	-159	>1046	>1815
8	" " " " "	-16	>1046	>1815
9	" " " " "	-78	>1046	>1815
10	" " " " "	-16	>1046	>1815
11	" " " " "	-247	>1046	>1815
12	" " " " "	-64	>1046	>1815
13	" " " " "	-86	>1046	>1815
14	" " " " "	-79	>1046	>1815
15	" " " " "	-10	>896	>1815
16	" " " " "	-57	>1046	>1815
17	" " " " "	161	< 4	< 9
18	" " " " "	27	214	601
19	" " " " "	-93	>1046	>1815
20	" " " " "	-80	>1046	>1815
21	" " " " "	160	< 4	< 9
22	" " " " "	114	7	17
23	" " " " "	-4	710	>1815
24	" " " " "	-97	>1046	>1815
25	" " " " "	-82	>1046	>1815
26	" " " " "	-78	>1046	>1815
27	" " " " "	8	446	1308
28	" " " " "	-70	>1046	>1815
29	" " " " "	54	75	198
30	" " " " "	150	< 4	< 9
31	" " " " "	24	240	679
32	" " " " "	-120	>1046	>1815
33	" " " " "	38	139	382
34	" " " " "	2	563	1672
35	" " " " "	-69	>1046	>1815
36	" " " " "	79	29	71
37	" " " " "	-47	>1046	>1815

AKET C .K . WHITE ALICE STATION . PAG EVEN

SAMPLES TESTED

TION	MV	PPM 1260	PPM 1242
NORTH-EAST OF AIRSTRIP	- 19	>1046	>1815
" " "	119	6	14
" " "	21	270	768
" " "	- 60	>1046	>1815
" " "	- 50	>1046	>1815
" " "	35	157	433
" " "	-141	>1046	>1815
" " "	- 29	>1046	>1815
" " "	21	270	768
" " "	- 87	>1046	>1815
" " "	- 51	>1046	>1815
" " "	47	99	265
" " "	139	< 4	< 9
" " "	- 19	>1046	>1815
" " "	-153	>1046	>1815
" " "	- 21	>1046	>1815
" " "	- 63	>1046	>1815
" " "	- 4	710	>1815
" " "	- 92	>1046	>1815
" " "	- 86	>1046	>1815

APPENDIX E

FINDING OF NO SIGNIFICANT CONTAMINATION AND
PCB CLEARANCE CERTIFICATE

Finding of No Significant Contamination

KALAKAKET CREEK RADIO RELAY SITE 12 SEP 1985

This excess real property contains no known contamination as specified by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, the Toxic Substance Control Act of 1976, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the implementing Environmental Protection Agency, Federal Regulations (40 CFR 261, 262, 263 and 761), and the Federal Property Management Regulations (41 CFR 101).

Bill E. Slone

BILL E. SLONE, WS-13
Chief, Operating Engineers

Description of Site:

The parcel of land to be excessed is in S½, Sec. 22, T.12S., R.10E., K.R.M. Nulato Quad B2.

The area to be excessed is more specifically described in Tab A of the Declaration of Excess.

PCB CLEARANCE CERTIFICATE

KALAKAKET CREEK RADIO RELAY SITE 12 SEP 1985

This is to certify that a records check and an on-site inspection indicate that this property has been cleared of PCB materials or equipment in accordance with applicable State and Federal laws.

Bill E. Slone

BILL E. SLONE, WS-13
Chief, Operating Engineers

Description of Site:

The parcel of land to be excessed is in S½, Sec. 22, T.12S., R.10E., K.R.M. Nulato Quad B2.

The area to be excessed is more specifically described in TAB A of the Declaration of Excess.

APPENDIX F

PHOTOGRAPHS

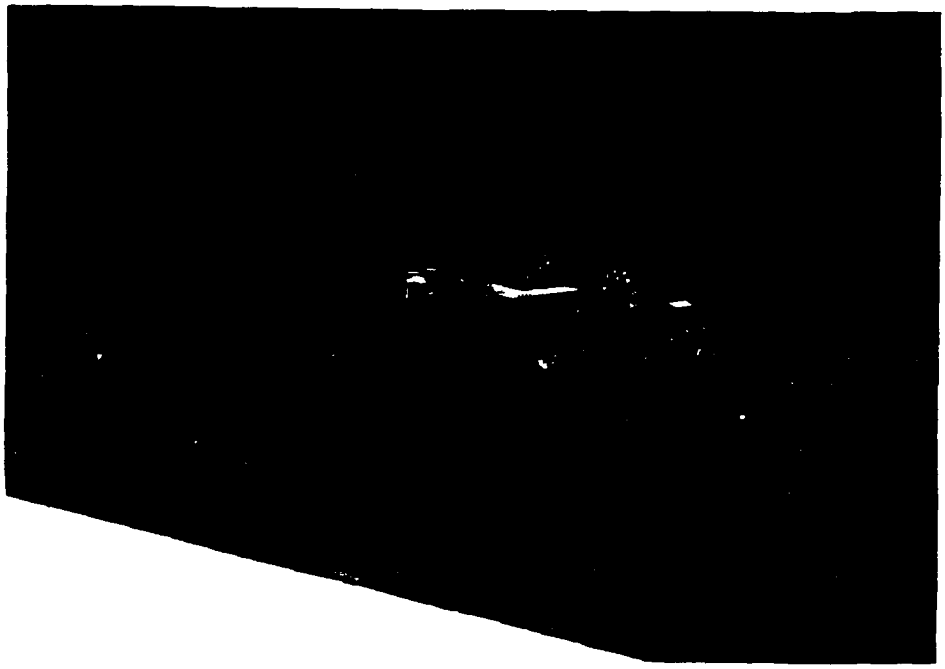


Photo 1. Aerial View of Kalakaket Creek RRS, Alaska.

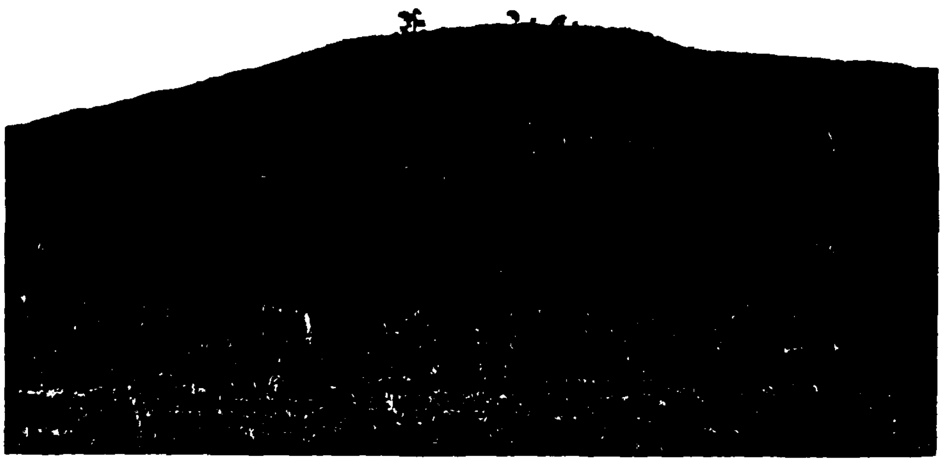


Photo 2. View of Kalakaket Creek RRS from the runway.

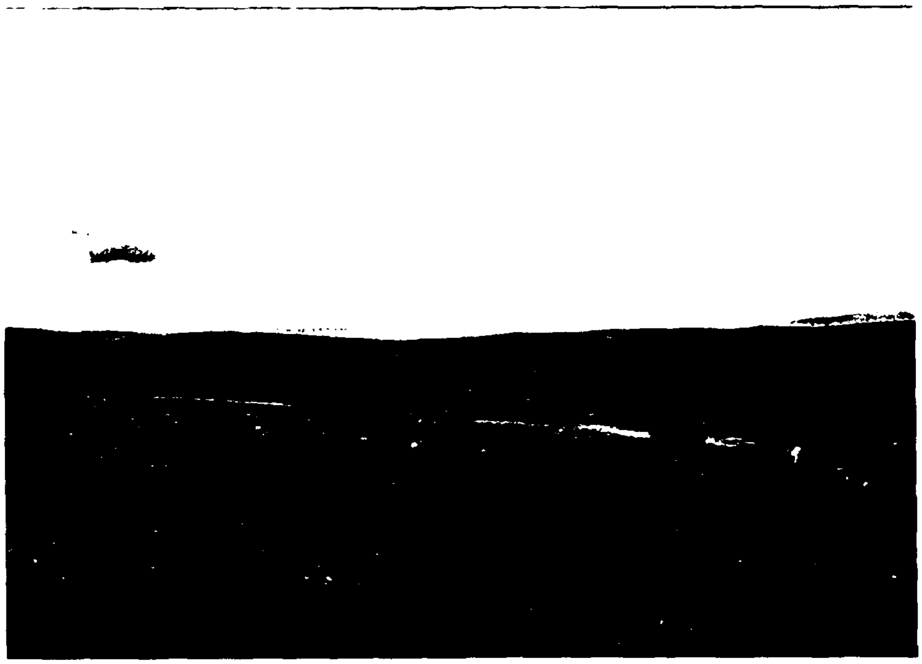


Photo 3. View of the runway.

Photo 4. Fuel tanks at Kalakaket Creek RRS, Alaska.

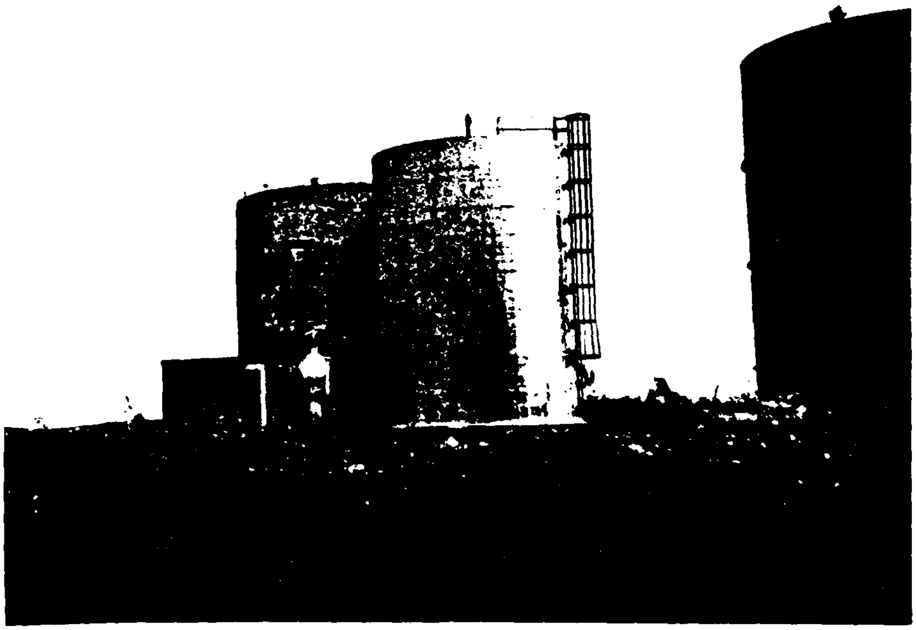


Photo 5. Water tanks at Kalakaket Creek RRS, Alaska.

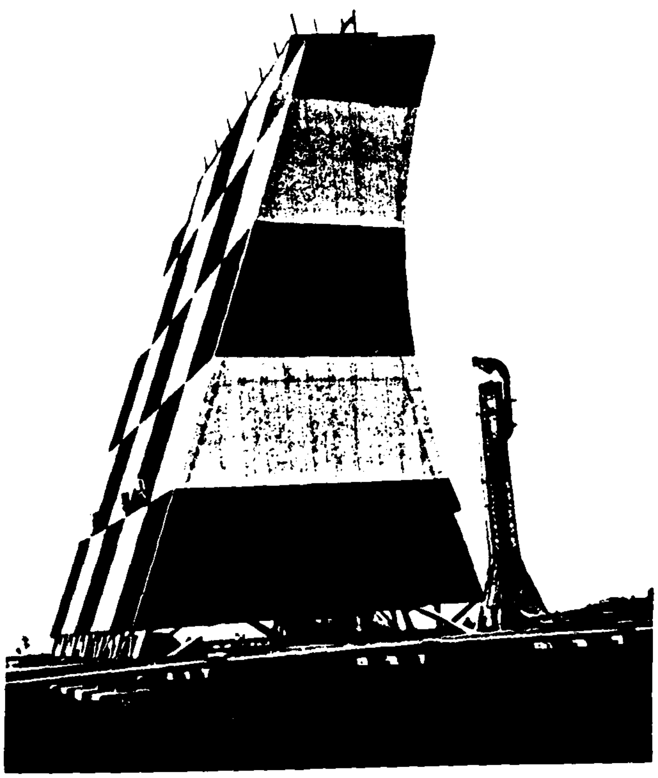


Photo 6. Sixty foot antenna.

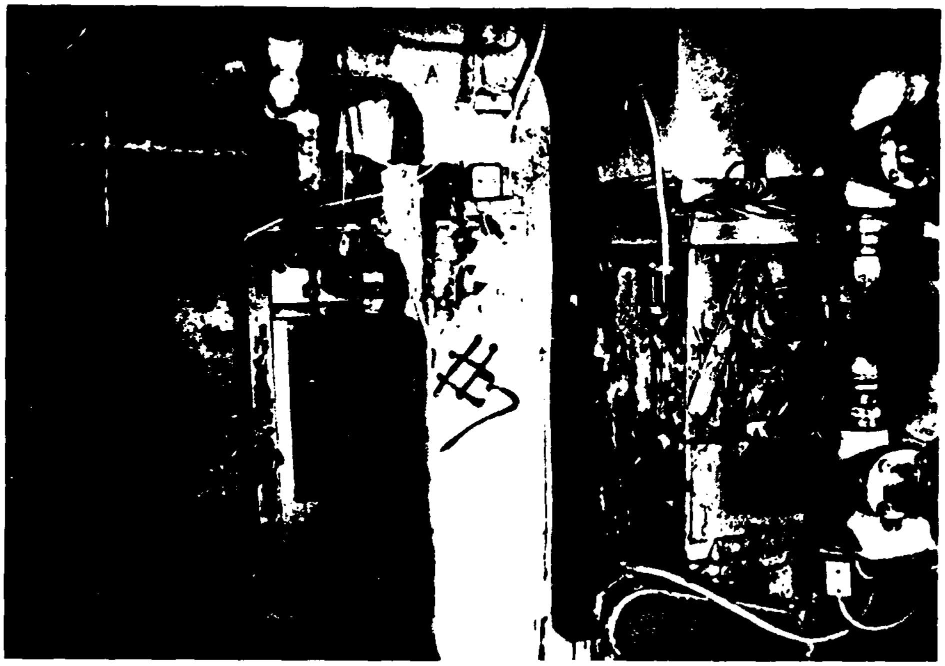


Photo 7. Marked and labeled asbestos.

Photo 8. Marked and labeled asbestos.

Photo 9.   Abandoned 55-gallon drum on the hillside.

Photo 10.   Abandoned 55-gallon drum on the hillside.

Photo 11. PCB soil testing outside the transformer room.

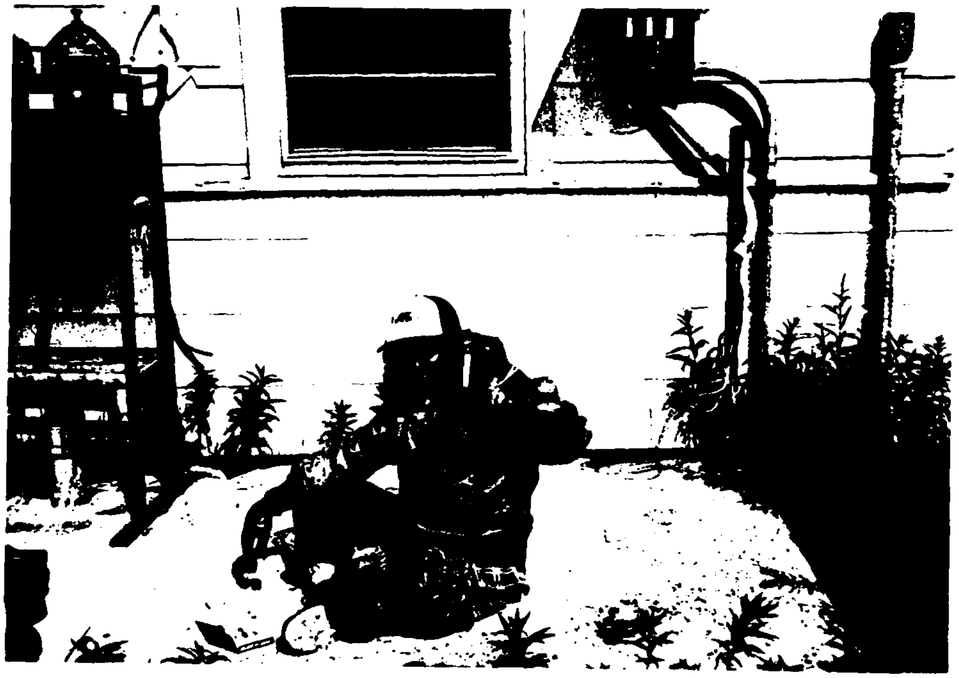


Photo 12. PCB soil testing outside the transformer room.

Photo 13. Partially full 55-gallon drum of lube oil abandoned in the temporary garage.

Photo 14. Abandoned vehicles.

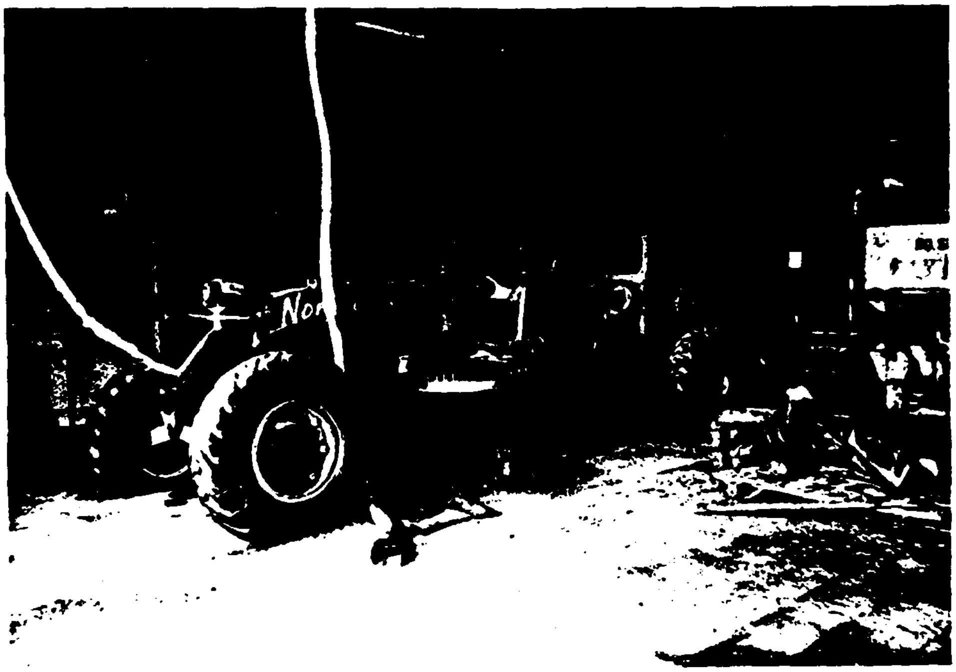


Photo 15. Abandoned vehicles.

Photo 16. Abandoned cylinders used for fire fighting.